Exhibit C

Exhibit C
August 14, 2002 Draft

Information Retrieval and Display System

Inventor:
Alan Swahn

FIELD OF THE INVENTION

This invention relates to information retrieval and display in a networked communications environment and is hereinafter referred to as "IRDS". The networked communications environment ("Network") includes Wide Area Networks (WAN), Metropolitan Area Networks (MAN), Local Area Networks (LAN), wired and wireless systems that permit multiple computers to communicate utilizing a set of protocols, such as Transmission Control Protocol/Internet Protocol (TCP/IP) and Hypertext Transfer Protocol (HTTP), in a internet, intranet, or extranet environment. An embodiment of IRDS may be, but not limited to, a standalone application computer program or an add-on to an existing computer program, such as a conventional web browser including but not limited to Microsoft's Internet Explorer and Netscape's Navigator.

IRDS (i) calls a search engine program, which may be embedded in the browser or available as a Network resource and provides the search engine with a search topic and any available options and search constraints; (ii) accepts a list of hyperlinks returned by the search engine, where the hyperlinks points to where the web pages are expected to reside on the Network; (iii) concurrently loads one or more pages from the Network into the browser; (iv) directs the browser to displays one or more such pages in the browser simultaneously and (v) operates on one or more pages at the same time with subsequent direction provided to the browser. A browser that has been enhanced with IRDS capability will be hereinafter referred to as "Enhanced Browser".

IRDS capitalizes on the availability of (i) high bandwidth networks, such as Broadband cable networks rated at up to 1.5 Mbits/sec. and Digital Subscriber Line (DSL) networks rated at up to 1.5 Mbits/sec., but also may be available at 384 or 768 Kbits/sec.; (ii) multithreaded computer architectures; (iii) large inexpensive computer memory storage.

BACKGROUND

Common search engines “Search Engines” include, but are not limited to Google, Yahoo!, AltaVista, Lycos, Webcrawler, Excite, Northern Light, MSN Search, iWon, HotBot, AlltheWeb, Teoma, DMOZ, DOGPILE, WizeNut, Overture, AOL, Ask Jeeves, Inktomi, LookSmart, and Netscape. Search Engines differentiate themselves mainly on content and features. The size of the search engine database is one of the content metrics. Specialized content hyperlinks may include: news, music files, auctions, employment, insurance, loans, yellow pages, white pages, email addresses, sports, shopping, movies, classifieds, health, images, movies, home life, finance, stocks, and travel. Features may include search options such as: language selection, word exclusion, exact phrases to be returned, number of pages to be returned, file format, returning results from specific website domain, and content blocks. Some search engines are website domain specific such as Dell, GM, and Sears and are accessed from their respective websites.

Web browsers include but are not limited to Internet Explorer, Netscape Navigator, Mozilla, Opera, Konqueror, and Galeon. Web browsers have differentiated themselves by computer operating system support (such as Apple, Microsoft Windows, and Unix), page download speed, computer memory usage and compliance to standards.

Today, there are two common methods searching for information on the Internet. First is a serial process of using a web browser to go to a Search Engine website; entering the search topic, options and constraints; executing the search; a list of hyperlinks (usually a set of ten (10) at one time) are returned and displayed by the web browser; clicking on a single hyperlink from the list; being vectored to the associated website; reviewing the information that resides on the website in the browser; and returning to the Search Engine website to click on another hyperlink to continue the process for each such successive hyperlink. To view the next set (usually ten) of hyperlinks requires selecting a hyperlink to render the next set of hyperlinks in the browser. This laborious ping-pong process between the websites and the Search Engine hyperlink list is continued until the sought after information is found or by quitting the search, if there is simply not enough time to find the information.

The second common search method requires a web browser with integrated search. This type of browser, such as Microsoft's Internet Explorer, allows a search topic, options and constraints to be entered into the browser, without first going to the search engine website. The search engine itself is not required to be part of the browser. The browser can contact the search engine and pass the topic to search, options, and constraints. The list of hyperlinks returned from the search engine can then be formatted and displayed in the browser. A list of hyperlinks is usually displayed in one panel of the browser, similar to the first search method. In a second browser panel an image and description of the page associated with the hyperlink is displayed. These images are simple hyperlinks to the associated website. This has distinct advantages over the first method in not returning to the search engine website to select each successive hyperlink.

There are multiple inherent problems that stem from an age where network bandwidth was limited and costly. Internet browsers are mostly serial from the users perspective as 'search the web' is an analogy for hopping between a Search Engine website and the websites from the Search Engine hyperlink list. Even method two searches (browsers with integrated search) requires selection from a hyperlink list (text or hyperlinked image) to display the next website page associated with that hyperlink. Every website has its own latency in responding to a browser, such that the browser can download the page and render the page in the display. Hence the time to review multiple website pages includes the website response time and Network latency from every website. The time to select the next hyperlink must be added to this latency as well. If the average website response time and Network latency per page is 7 seconds and the time required to select the next hyperlink is 3 seconds, then the extra time to get to the next website page from the hyperlink list is 10 seconds per hyperlink. To review 400 hyperlinks listed by a Search Engine would then require over 1 hour of extra (wasted) time. Method one search take even longer, as the user must first return to the Search Engine website before selecting the next successive hyperlink.

An Enhanced Browser solution is needed that removes the foregoing requirements and makes searching for information a fast efficient process that displays not text hyperlinks or image hyperlinks to websites, but displays the web pages themselves one or more at a time.

SUMMARY

An Enhanced Browser is described that removes the requirements (i) to go to a Search Engine website to start a search; (ii) to select a hyperlink returned by the Search Engine to review the next website page; and (iii) to select the "next set" hyperlink to render the next grouping of hyperlinks associated with the search topic. Such an Enhanced Browser allows multiple web pages to be displayed simultaneously and operated on individually.

This Enhanced Browser sends the search topic, options and constraints to one or more Search Engines without going to the Search Engine websites. The lists of hyperlinks returned from one or more Search Engines is aggregated and prioritized by the Enhanced Browser. The Enhanced Browser loads a number of the associated website pages into the Enhanced Browser concurrently for review. The number of pages to load concurrently will depend on the Network bandwidth, how much computer memory is available, and to a much smaller degree, the computer processor speed. Network bandwidth, computer memory, and processor speed will be collectively referred to as "Power". If sufficient Power is available, all the pages may be loaded concurrently and made available for Enhanced Browser display. In a more likely scenario, there will be some Power limitations.

The Enhanced Browser solution should provide a selectable number of pages to be loaded concurrently after a search is started from the list of hyperlinks that the search engine returns ("Concurrent Page Loading"). In addition to this Concurrent Page Loading, one or more look-ahead page loading mechanisms should be provided for the remaining unloaded pages, to ensure a near instantaneous page review experience.

Look-ahead page loading mechanisms can apply to conventional browsers, as well as, an Enhanced Browser. Such mechanisms could include (i) a next-in-queue look-ahead page loading method (“Next-In-Queue Page Loading”); (ii) a periodic opportunistic look-ahead page loading method (“Periodic Opportunistic Page Loading”); (iii) and/or a preemptive descendant look-ahead page loading method (“Preemptive Descendant Page Loading”).

Next-In-Queue Page Loading refers to a method that loads the next page or pages pointed to in a hyperlink queue that haven’t been previously loaded by Concurrent Page Loading, Periodic Opportunistic Page Loading, or Preemptive Descendant Page Loading. While one or more web pages are being displayed in the Enhanced Browser, these pages can be preloaded and subsequently displayed in an Enhanced Browser on demand.

Periodic Opportunistic Page Loading refers to a method whereby the hyperlink queue is scanned periodically for unloaded pages and preloads one or more of these pages, which may then be subsequently displayed in an Enhanced Browser on demand. These pages may be selectively preloaded depending on which pages are currently displayed, user preferences and/or other criteria, hence the preloading order is not required to be sequential.

Web pages (parents) referred to by the list of search engine hyperlinks may contain hyperlinks that point to other web pages (children), which in turn may contain hyperlinks that point to other web pages (grandchildren), in perpetuity collectively “Descendants”. Preemptive Descendant Page Loading refers to a method that preloads selected Descendants. Any such Descendants would be visible in the Enhanced Browser on demand. A selectable limit on the number of Descendants pages or generation of Descendants to preemptively preload should be provided, as the number of possible pages to preemptively load rises exponentially.

The Enhanced Browser allows one or more pages to be displayed at the same time, with pages from (i) the same website domain; or (ii) differing website domains. These pages would be fully active website pages, as if the multiple browsers were encapsulated in a master browser.

The Enhanced Browser would have a control panel to (i) operate on the pages which may include functions: to zoom in or out on a page; change the number of pages displayed; find and highlight the search topic within a page; display the next page or next set of pages depending on the number of pages being displayed at a given time; display any selected page or any set of pages depending on the number of pages displayed at a given time; bookmark selected pages or all the pages as a list of hyperlinks that can be recalled and the associated pages can be loaded into the Enhanced Browser without calling a Search Engine; delete a selected page or pages thereby pruning the list of pages; (ii) select a Search Engine or multiple Search Engines to be contacted; (iii) enter a search topic for the Search Engine and any options, criteria and/or constraints; (iv) execute a search; (v) display search statistics such as the number of hyperlinks returned by the Search Engine(s); and (vi) display page number(s) being viewed, highest page number preloaded, Network bandwidth, memory usage, and/or processor usage statistics.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is described with respect to particular exemplary embodiments thereof and reference is accordingly made to the drawings in which:

Figure 1 shows the distributed network environment for a conventional information search utilizing a search engine and web browser on a computer.

Figure 2 shows a typical search engine display in a browser with command and control, a list of textual hyperlinks returned from a search and optional value-add information.

Figure 3 shows a typical search engine display in a browser with command and control, a list of hyperlinked images returned from a search and optional value-add information.

Figure 4 shows a flowchart of the conventional information acquisition and review operation for a search performed with a conventional search engine.

Figure 5 shows a conventional browser with an integrated search function with command and control, a list of textual hyperlinks and a list of hyperlinked images returned from a search and optional value-add information.

Figure 6 shows a flowchart of a conventional information acquisition and review operation for a search performed with a browser with an integrated search function.

Figure 7 shows a flowchart of a browser serial page loading cycle after the browser has requested a new page from a website, if a valid cached copy is not available in computer memory.

Figure 8 shows that an Information Retrieval and Display System ("IRDS") can be (i) added to a conventional browser as an add-on program or (ii) can be incorporated in a new browser to create an Enhanced Browser.

Figure 9 shows that IRDS can be local to a computer or distributed on a Network such that one or more computer can load and run IRDS across a Network.

Figure 10 shows the IRDS command, control, status panel and a single (1) fully active website page displayed.

Figure 11 shows the IRDS command, control, status panel, and two (2) fully active website pages displayed.

Figure 12 shows the IRDS command, control, status panel, and four (4) fully active website pages displayed.

Figure 13 shows the IRDS command, control, status panel and nine (9) fully active website pages displayed.

Figure 14 shows a flowchart of the IRDS information acquisition and review cycle.

Figure 15 shows a flowchart of the IRDS search function.

Figure 16 shows an IRDS directed, browser concurrent multiple page loading from one or more websites, after a search has been initiated.

Figure 17 shows a flowchart that describes the IRDS directed, browser look-ahead Next-In-Queue Page Loading function, where when a request is made to view n pages, the next group of n web pages pointed to by the associated hyperlinks in the queue are loaded in display frames that are not visible but are immediately available to become visible and viewed upon demand.

Figure 18 shows a flowchart that describes the IRDS directed, browser look-ahead Next-In-Queue Page Loading function, where when a request is made to view n pages, the next group of n+k (where k is an integer greater than 0) web pages pointed to by the associated hyperlinks in the queue are loaded in display frames that are not visible but are immediately available to become visible and viewed upon demand.

Figure 19 shows a flowchart that describes the IRDS directed, browser look-ahead Periodic Opportunistic Page Loading function. After a page is loaded into a browser display frame, the associated hyperlink in the hyperlink queue is marked as loaded. The Periodic Opportunistic Page Loading function scans the hyperlink queue for hyperlinks not marked as loaded and directs the browser to load one or more of the web pages pointed to by selected unmarked hyperlinks in display frames that are not visible but are immediately available to become visible and viewed upon demand. After directing the browser to load such pages, the unmarked hyperlinks are marked as loaded and the function waits a specified period of time before rescanning the hyperlink queue and repeating the process.

Figure 20 shows a flowchart that describes the IRDS directed, browser look-ahead Periodic Opportunistic Page Loading function with page loading collision avoidance. After a page is loaded into a browser display frame, the associated hyperlink in the hyperlink queue is marked as loaded. The Periodic Opportunistic Page Loading function scans the hyperlink queue for hyperlinks not marked as loaded and directs the browser to load one or more of the web pages pointed to by selected unmarked hyperlinks in display frames that are not visible but are immediately available to become visible and viewed upon demand, if such display frame is not already in the process of being loaded by a different type of look-ahead function as described in Figure 17 and Figure 18 for example. After directing the browser to load such pages, the unmarked hyperlinks are marked as loaded and the function waits a specified period of time before rescanning the hyperlink queue and repeating the process.

Figure 21 shows a flowchart that describes the IRDS directed, browser look-ahead Periodic Opportunistic Page Loading function with page loading collision avoidance, Network saturation avoidance, and processor saturation avoidance. After a page is loaded into a browser display frame, the associated hyperlink in the hyperlink queue is marked as loaded. The Periodic Opportunistic Page Loading function scans the hyperlink queue for hyperlinks not marked as loaded and directs the browser to load one or more of the web pages pointed to by selected unmarked hyperlinks in display frames that are not visible but are immediately available to become visible and viewed upon demand, if (i) such display frame is not already in the process of being loaded by a different type of load-ahead function as described in Figure 17 and Figure 18 for example; (ii) the Network bandwidth has not become saturated; and (iii) the computer processor has not become saturated. After directing the browser to load such pages, the unmarked hyperlinks are marked as loaded and the function waits a specified period of time before rescanning the hyperlink queue and repeating the process.

Figure 22 depicts an IRDS directed, browser look-ahead Preemptive Descendant Page Loading, where the Descendant pages pointed to by hyperlinks that reside on pages that have been already loaded into display frames whether or not visible, are preemptively loaded into cache memory or frames that are not visible. A user then selecting a hyperlink on a visible page would immediately have the page associated with such hyperlink available on demand and made visible.

Figure 23 shows a flowchart and drawing associated with selecting the number of web pages to display at a given time.

Figure 24 shows a flowchart and drawing associated with selecting a page in a multi-page Enhanced Browser display and changing the zoom factor for a selected page.

Figure 25 shows a drawing associated with selecting a page in a multi-page Enhanced Browser display and making the selected page encompass the entire screen area allotted for the multi-page display, which is equivalent to setting the number of website pages to display to one.

Figure 26 shows a drawing associated with removing a selected page from a multi-page Enhanced Browser display and removing the hyperlink associated with the selected page from the hyperlink queue.

Figure 27 shows a drawing associated with book-marking a selected set of hyperlinks, where such set of hyperlinks can be recalled and used to reload the pages pointed to by such hyperlinks into the Enhanced Browser.

Figure 28 shows a drawing associated with jumping from an IRDS mode to a conventional browser mode for a selected page.

Figure 29 shows a drawing associated with selecting any portion of a displayed page or pages, if in a multi-page display mode, and creating an image in a standard image format, such as Joint Photography Experts Group (“JPEG”), Graphics Interchange Format (“GIF”), or bitmapped (“BMP”) that can be saved to storage such as a hard drive or Compact Disk (CD) or copied to another computer application, such as a word processor, spread sheet, or presentation program.

DETAILED DESCRIPTION OF THE INVENTION

Conventional Search Engine Information Retrieval Paradigm

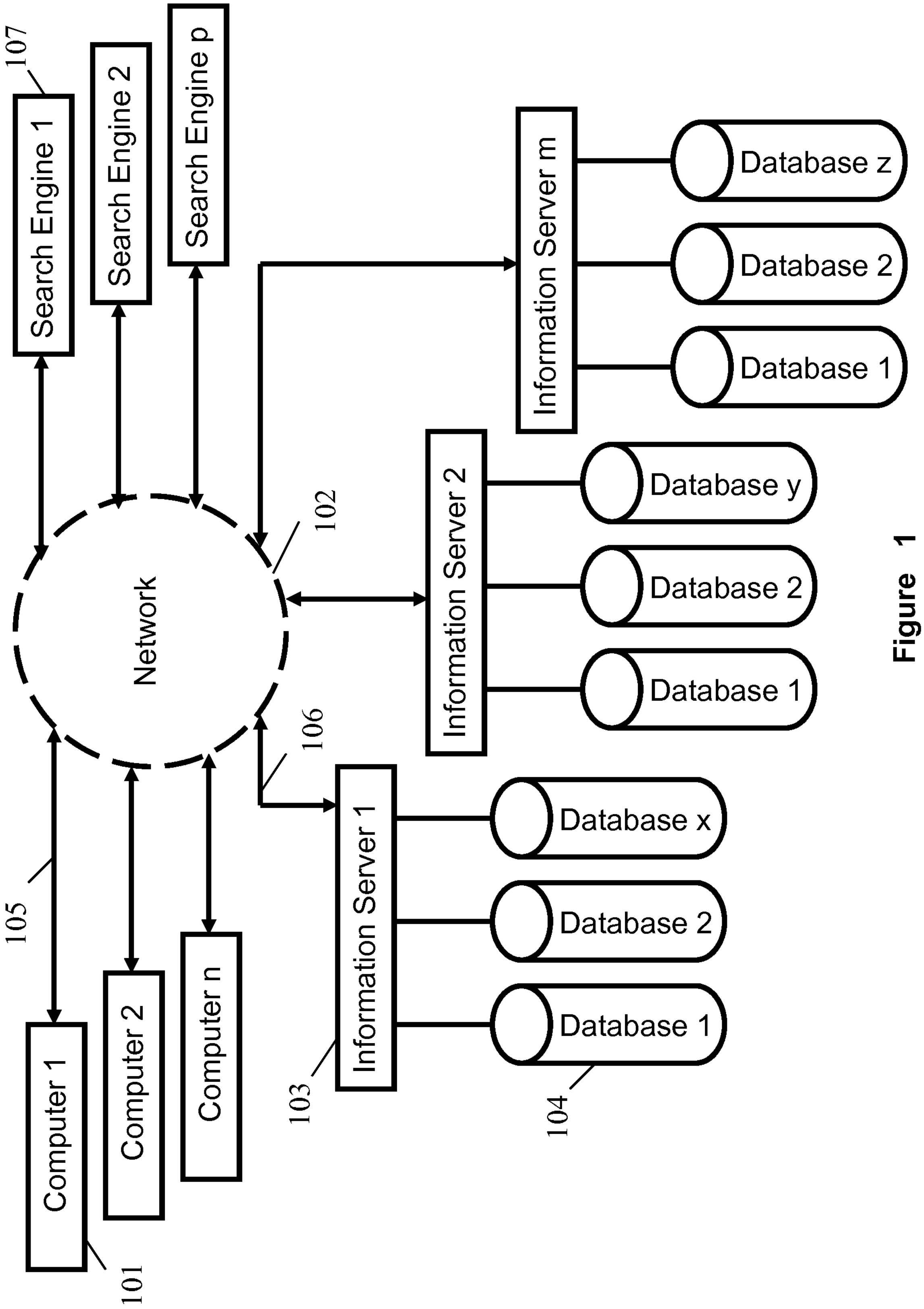

Figure 1

Conventional Text Search Paradigm

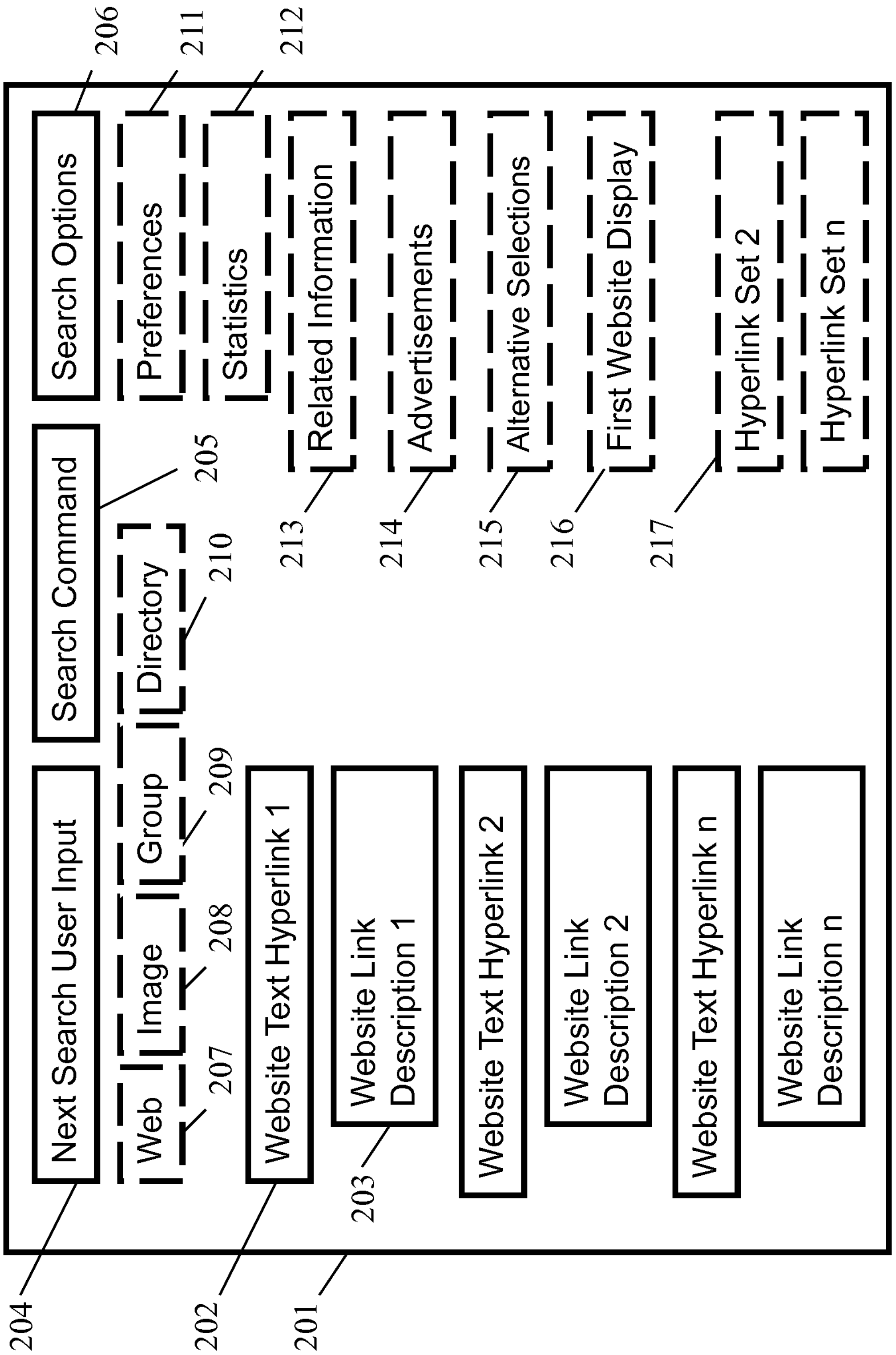

Figure 2

Conventional Image Search Paradigm

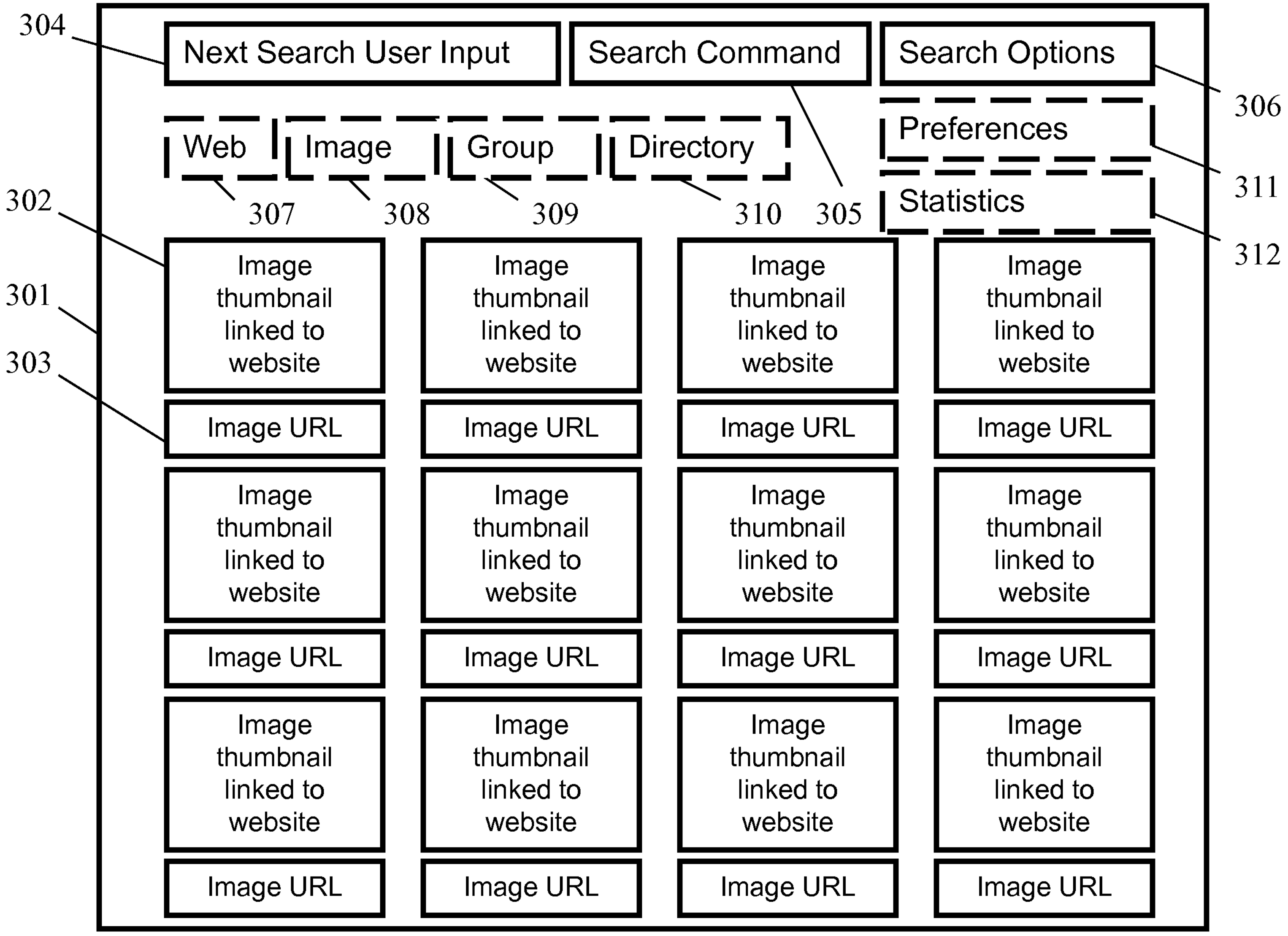
304
Next Search User Input
Search Command
Search Options
306
Web
Image
Group
Directory
Preferences
311
307
308
309
310
305
Statistics
312
302
301
303
Image thumbnail linked to website
Image URL
Image thumbnail linked to website
Image URL
Image thumbnail linked to website
Image URL
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Image thumbnail linked to website
Image URL
Image thumbnail linked to website
Image URL

Figure 3

Conventional Information Acquisition and Review Cycle

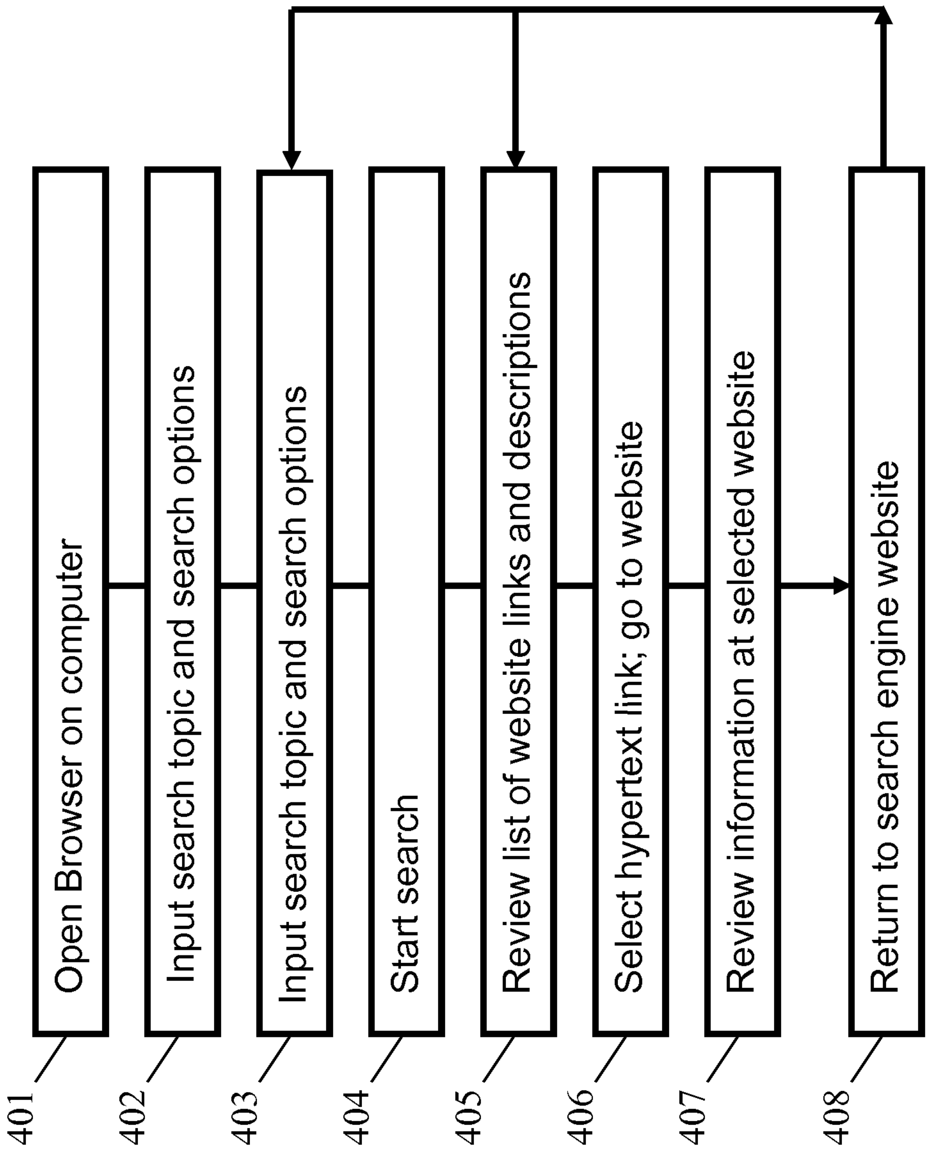

401
Open Browser on computer
402
Input search topic and search options
403
Input search topic and search options
404
Start search
405
Review list of website links and descriptions
406
Select hypertext link; go to website
407
Review information at selected website
408
Return to search engine website

Figure 4

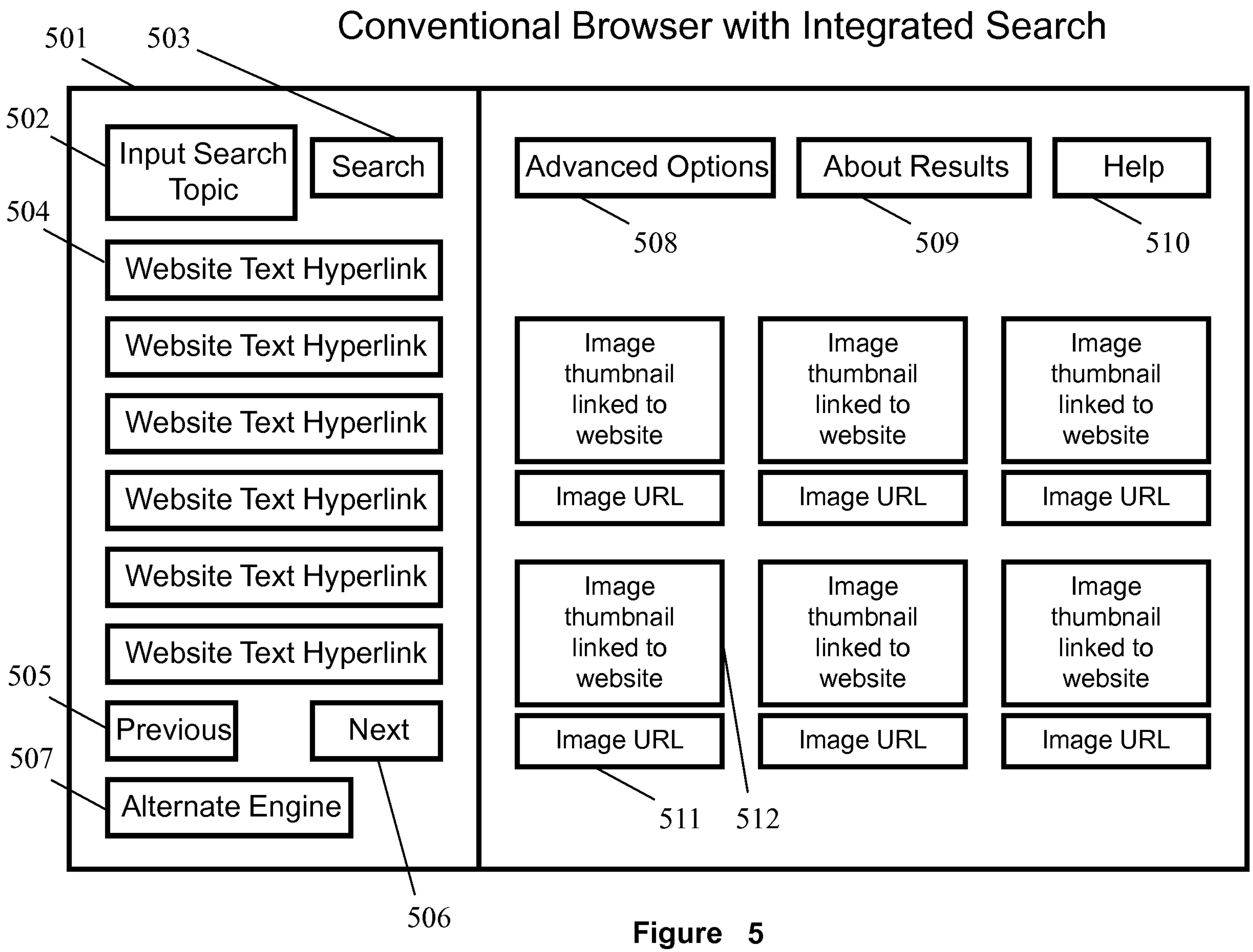

Conventional Browser with Integrated Search
501
503
502
Input Search Topic
Search
504
Website Text Hyperlink
Website Text Hyperlink
Website Text Hyperlink
Website Text Hyperlink
Website Text Hyperlink
Website Text Hyperlink
505
Previous
Next
507
Alternate Engine
506
Advanced Options
About Results
Help
508
509
510
Image thumbnail linked to website
Image thumbnail linked to website
Image thumbnail linked to website
Image URL
Image URL
Image URL
Image thumbnail linked to website
Image thumbnail linked to website
Image thumbnail linked to website
Image URL
Image URL
Image URL
511
512

Figure 5

Conventional Information Acquisition and Review Cycle for Browser with Integrated Search

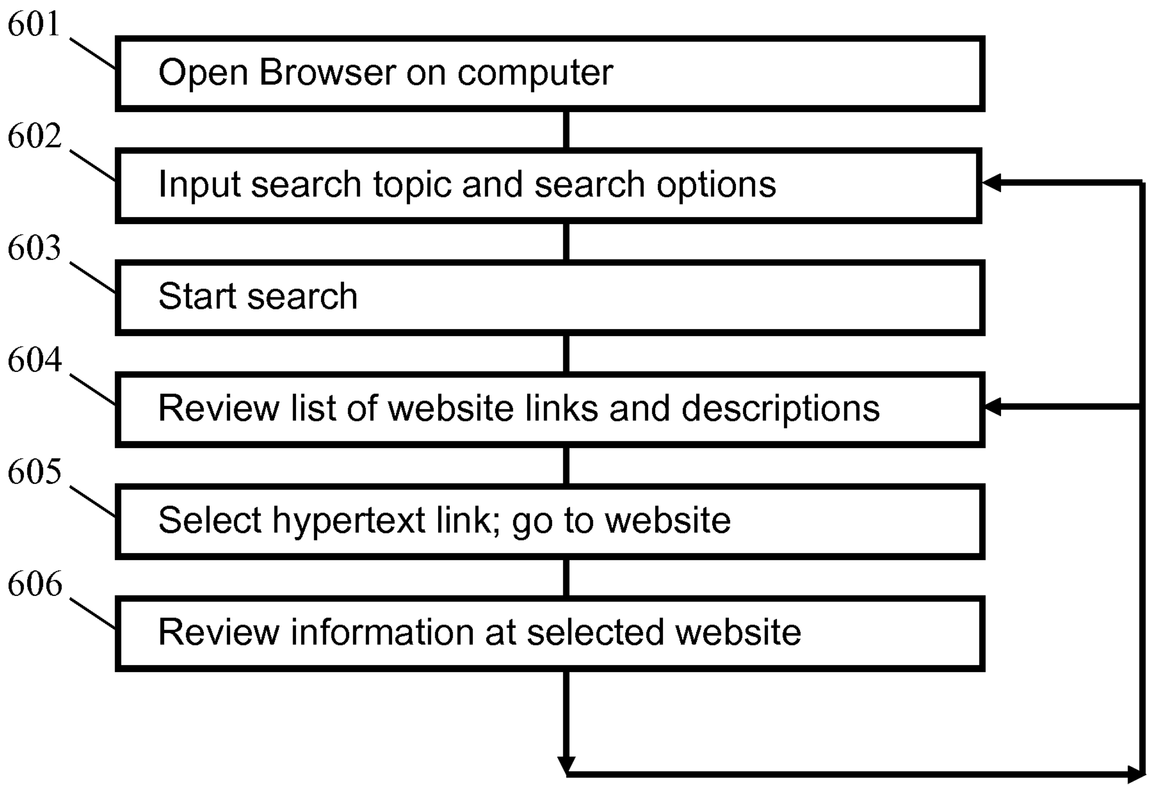
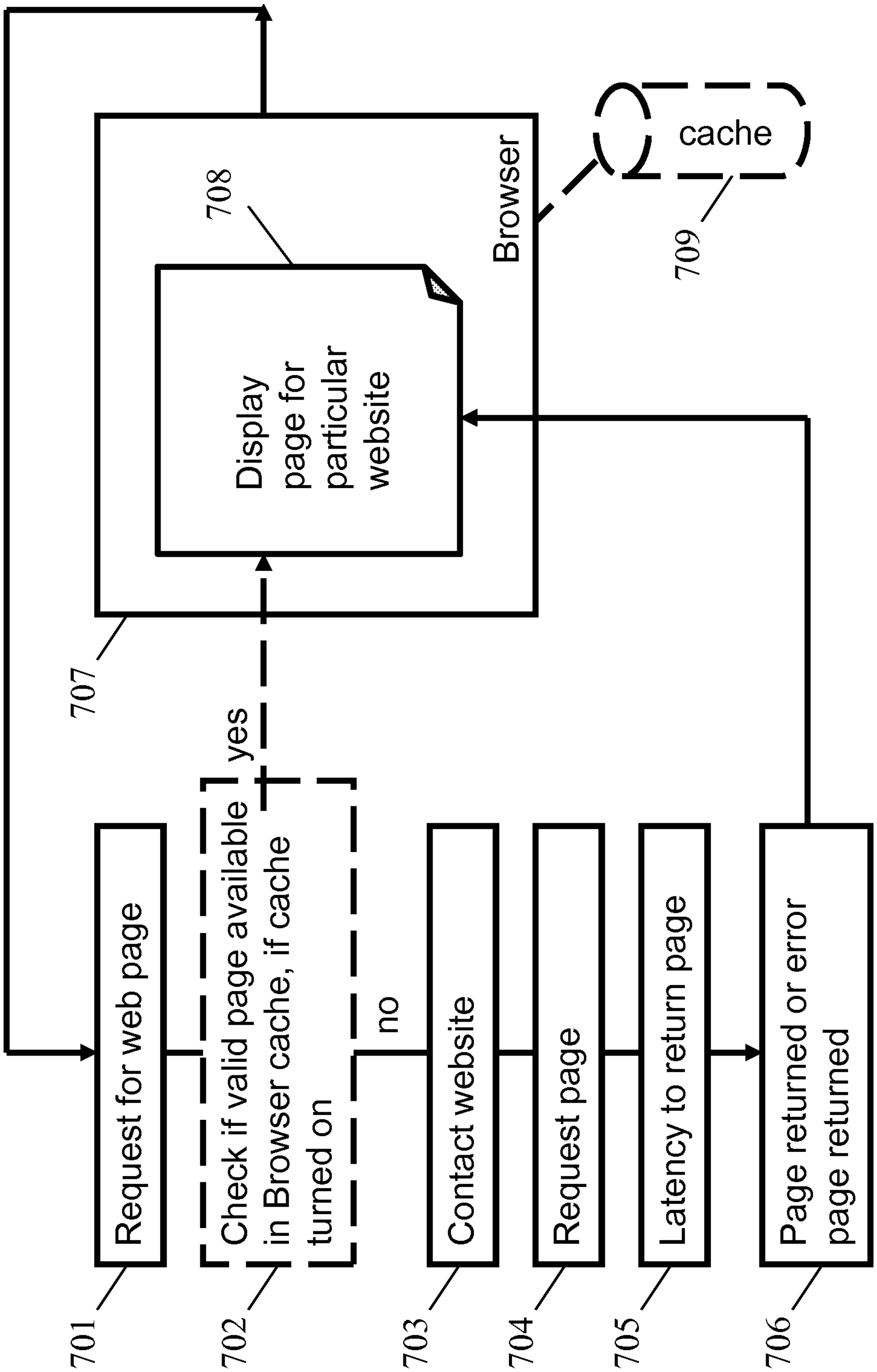

601
Open Browser on computer
602
Input search topic and search options
603
Start search
604
Review list of website links and descriptions
605
Select hypertext link; go to website
606
Review information at selected website

Figure 6

“Information Retrieval and Display System”
Alan Swahn, 95 Kara Drive, North Andover, MA, 01845, 978-794-1053, alan@swahn.com

Conventional Serial Page Loading Cycle



701
Request for web page
702
Check if valid page available in Browser cache, if cache turned on
yes
no
703
Contact website
704
Request page
705
Latency to return page
706
Page returned or error page returned
707
Browser
708
Display page for particular website
cache
709

Figure 7

Information Retrieval and Display System (“IRDS”)
Add-on to Conventional Browser or IRDS Enhanced Browser

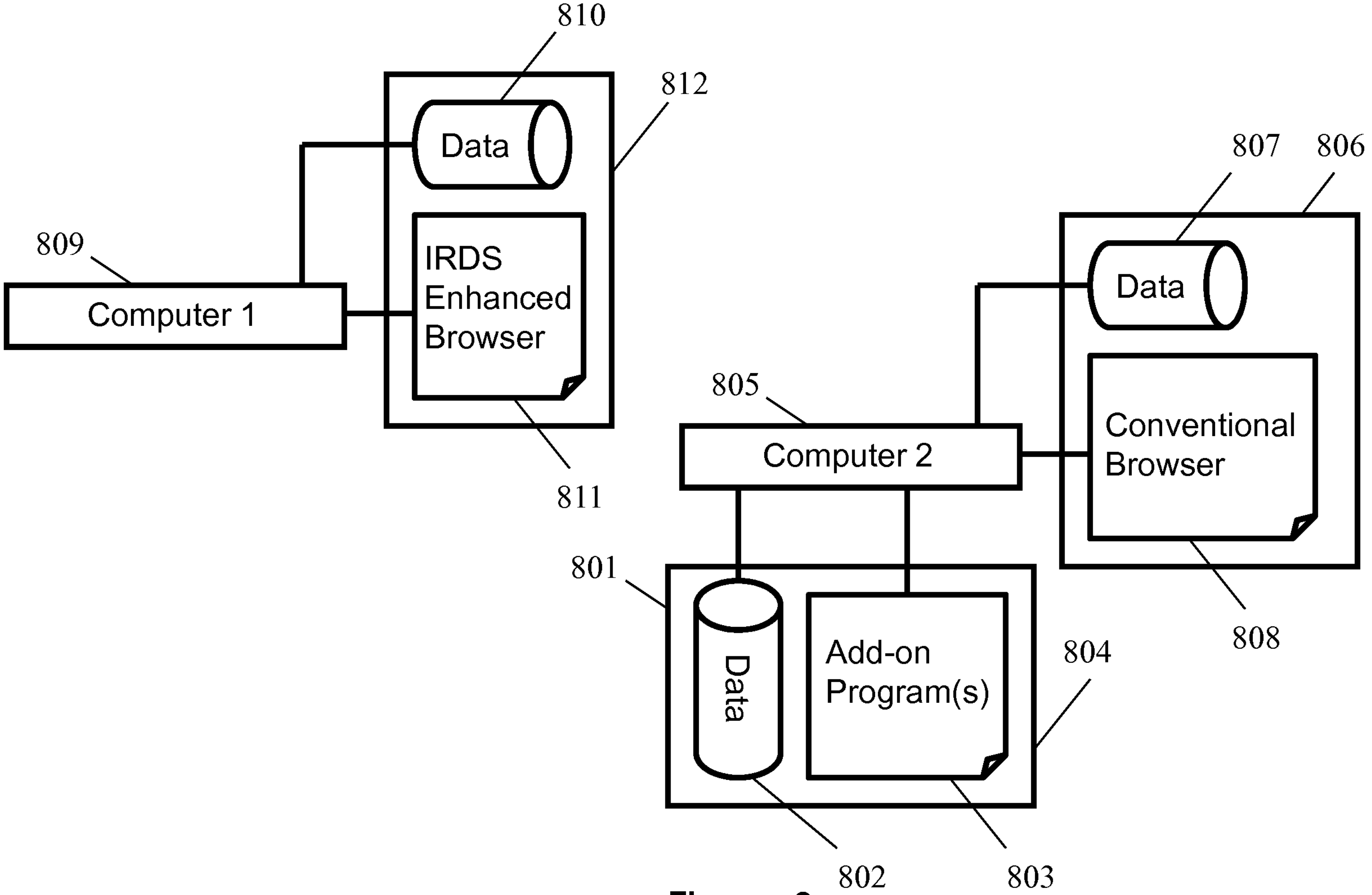


Figure 8

Local or Distributed IRDS and Data Access

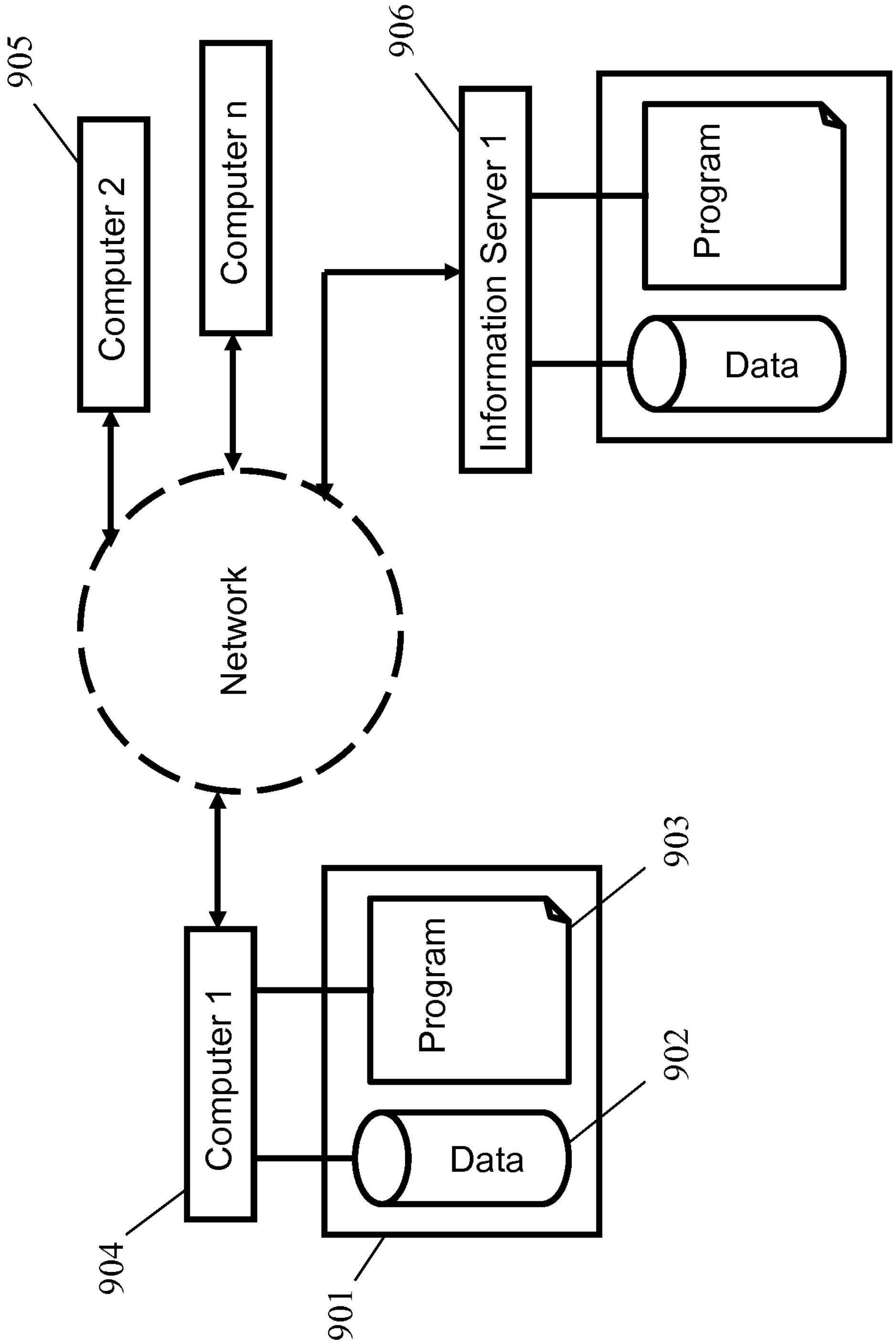


Figure 9

“Information Retrieval and Display System”
Alan Swahn, 95 Kara Drive, North Andover, MA, 01845, 978-794-1053, alan@swahn.com

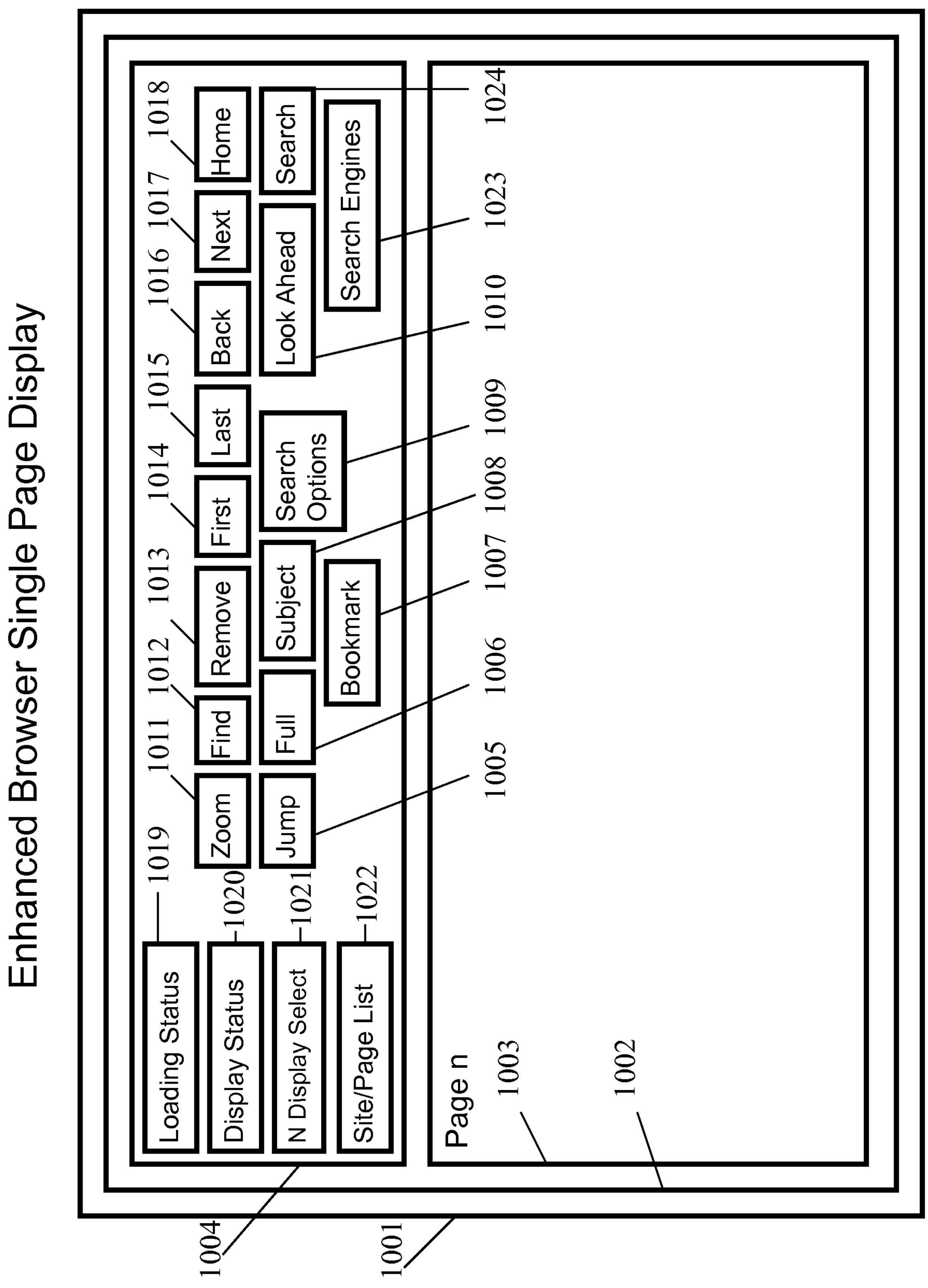


Figure 10

Enhanced Browser Concurrent Multiple Page Display

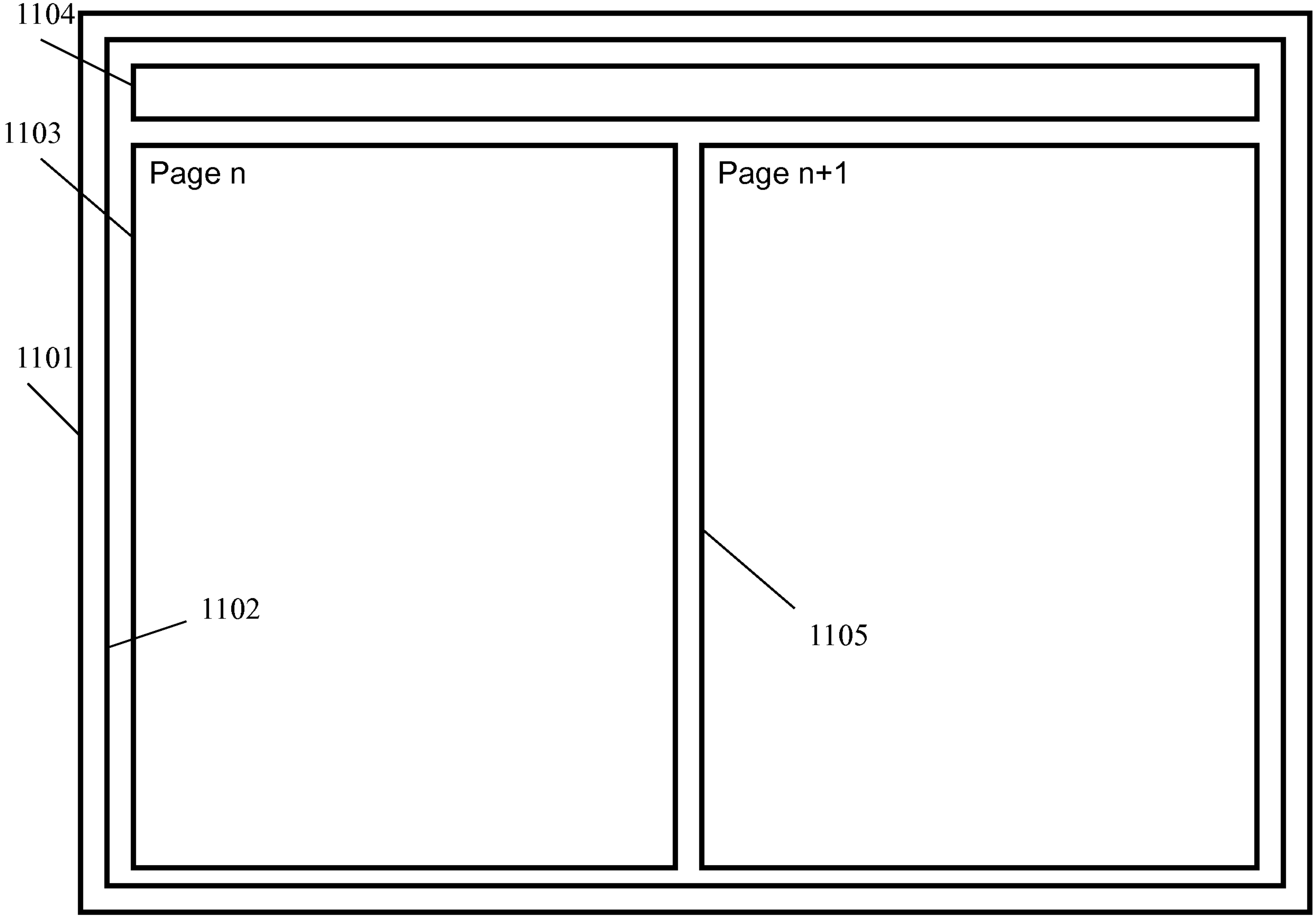


Figure 11

Enhanced Browser Concurrent Multiple Page Display

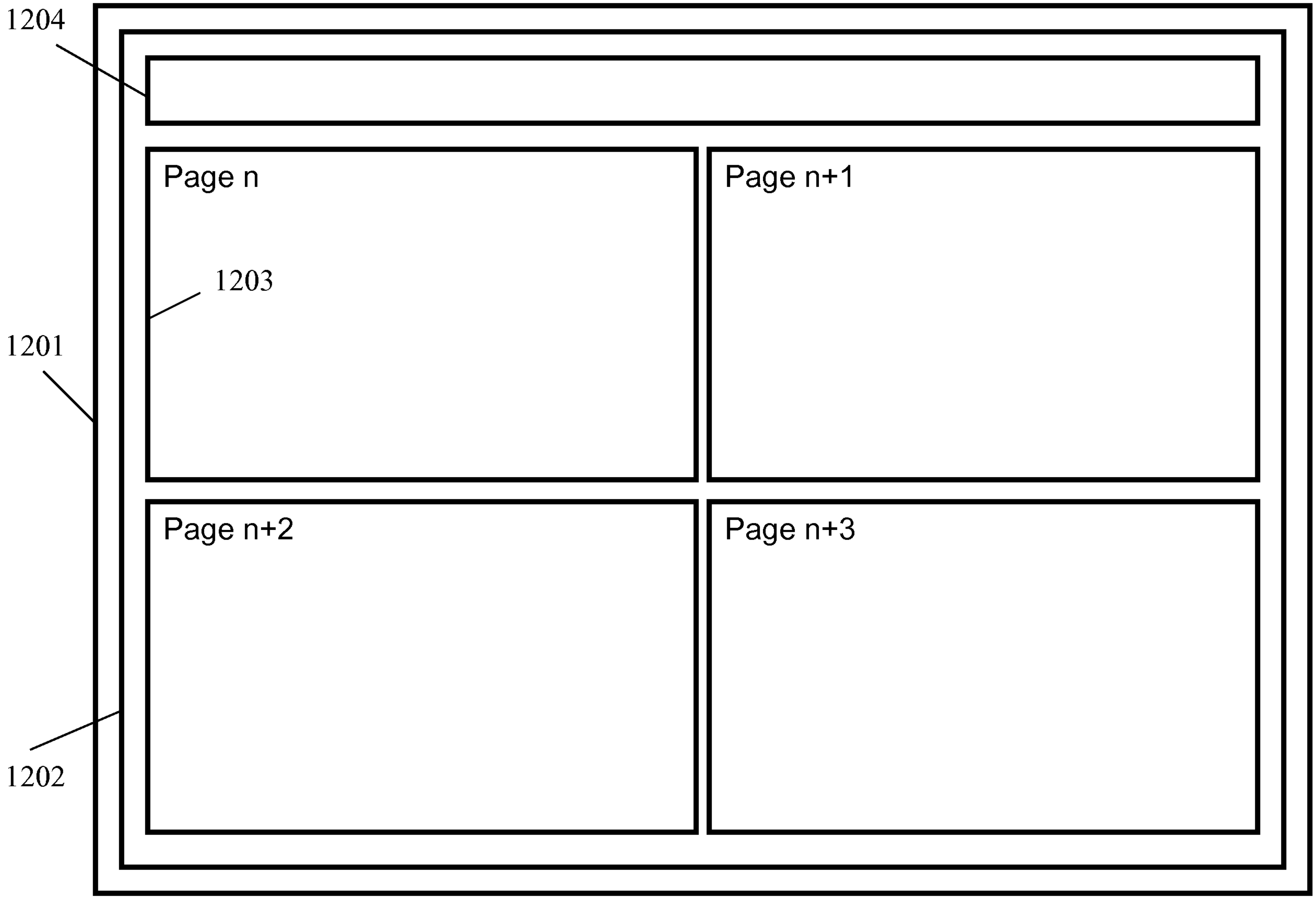


Figure 12

“Information Retrieval and Display System”
Alan Swahn, 95 Kara Drive, North Andover, MA, 01845, 978-794-1053, alan@swahn.com

Enhanced Browser Concurrent Multiple Page Display

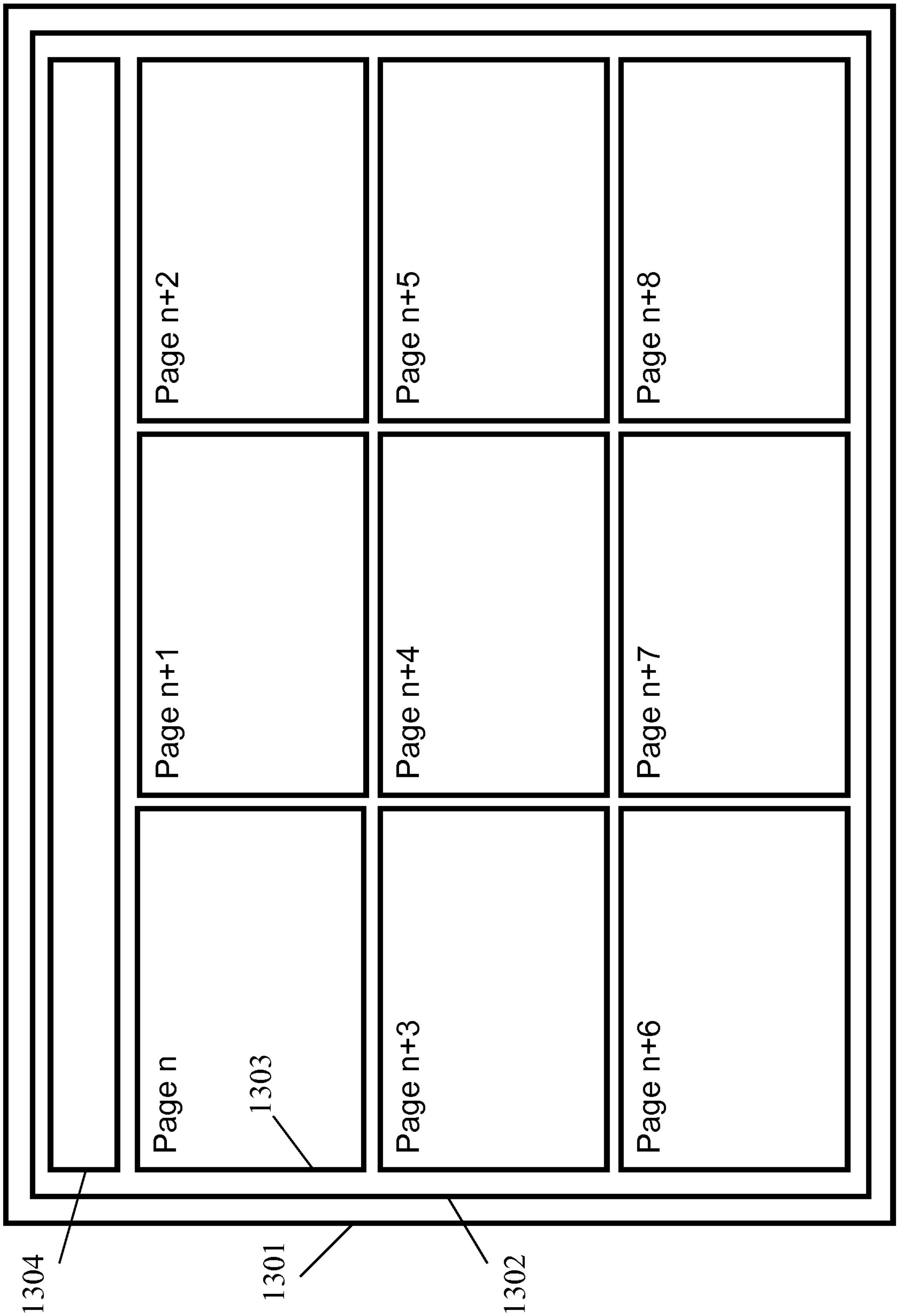


Figure 13

IRDS Information Acquisition and Review Cycle

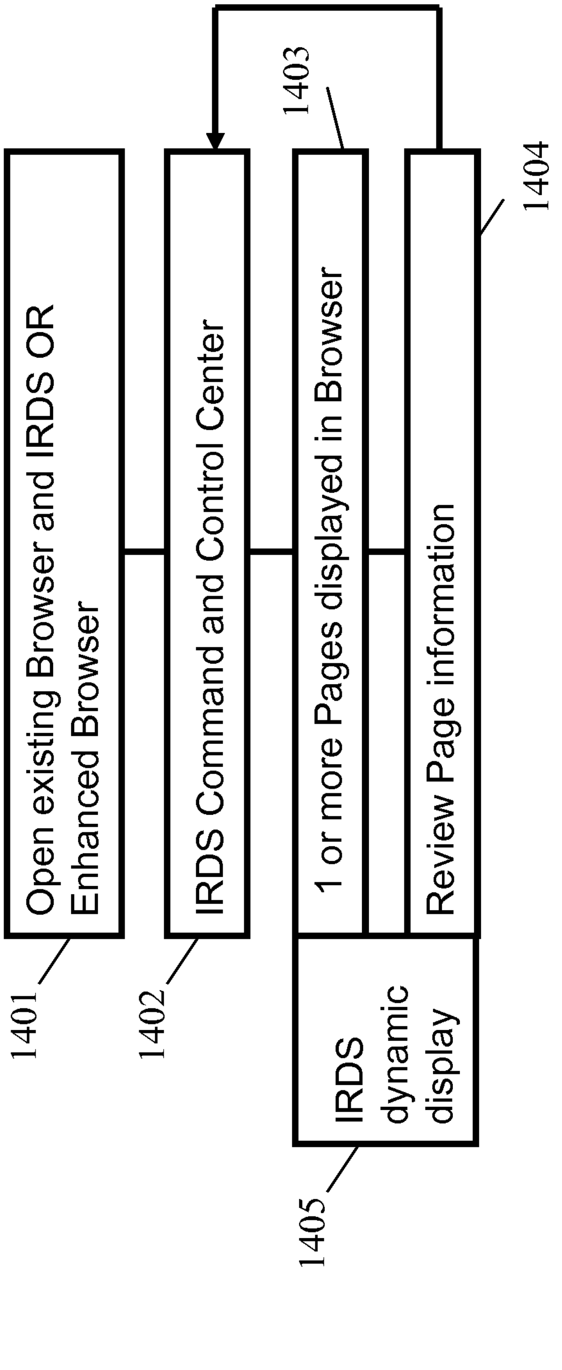

Open existing Browser and IRDS OR Enhanced Browser
1401
IRDS Command and Control Center
1402
1 or more Pages displayed in Browser
1403
Review Page information
1404
IRDS dynamic display
1405

Figure 14

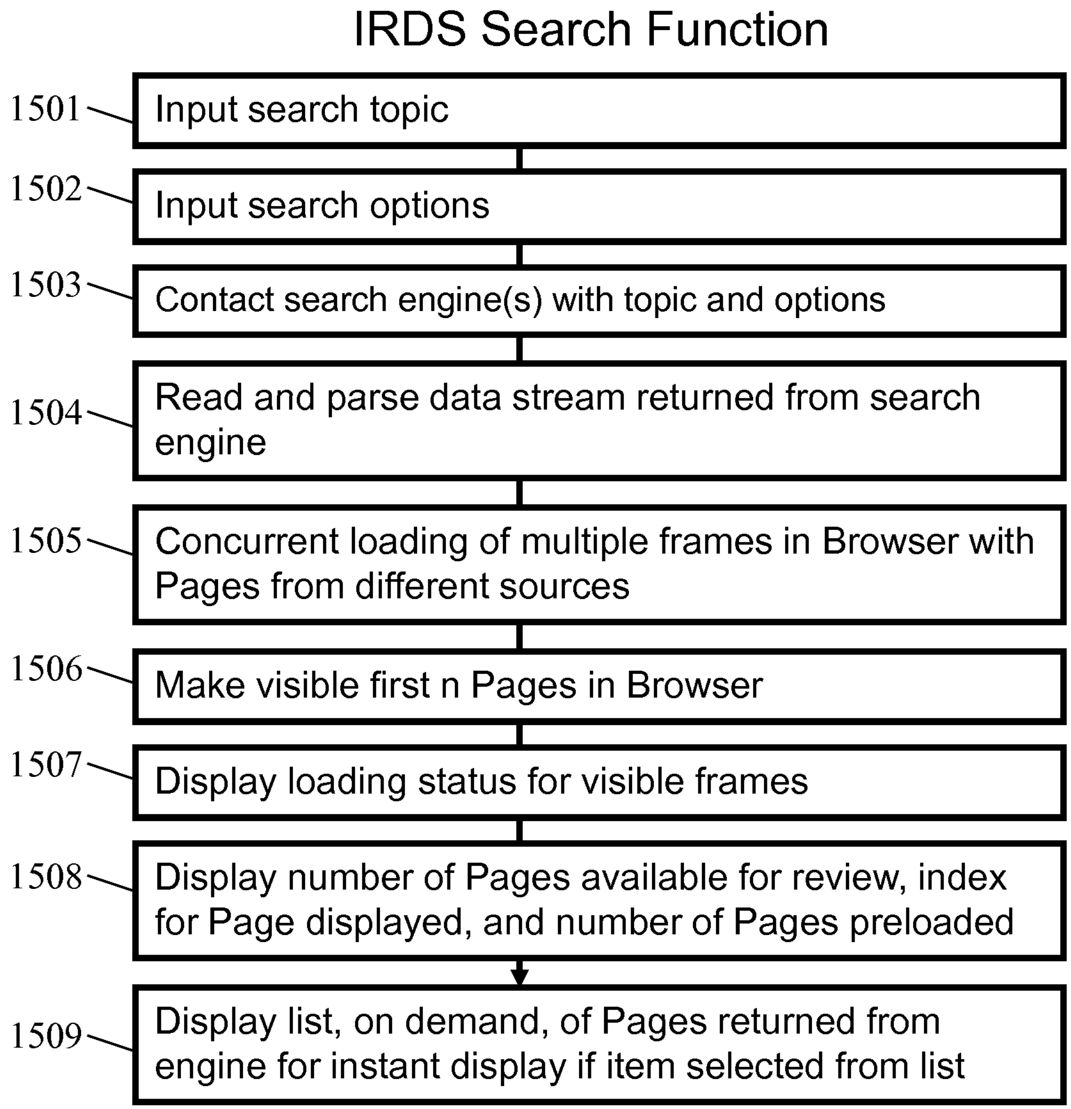

IRDS Search Function
1501
Input search topic
1502
Input search options
1503
Contact search engine(s) with topic and options
1504
Read and parse data stream returned from search engine
1505
Concurrent loading of multiple frames in Browser with Pages from different sources
1506
Make visible first n Pages in Browser
1507
Display loading status for visible frames
1508
Display number of Pages available for review, index for Page displayed, and number of Pages preloaded
1509
Display list, on demand, of Pages returned from engine for instant display if item selected from list

Figure 15

IRDS Directed Concurrent Multiple Page Browser Loading

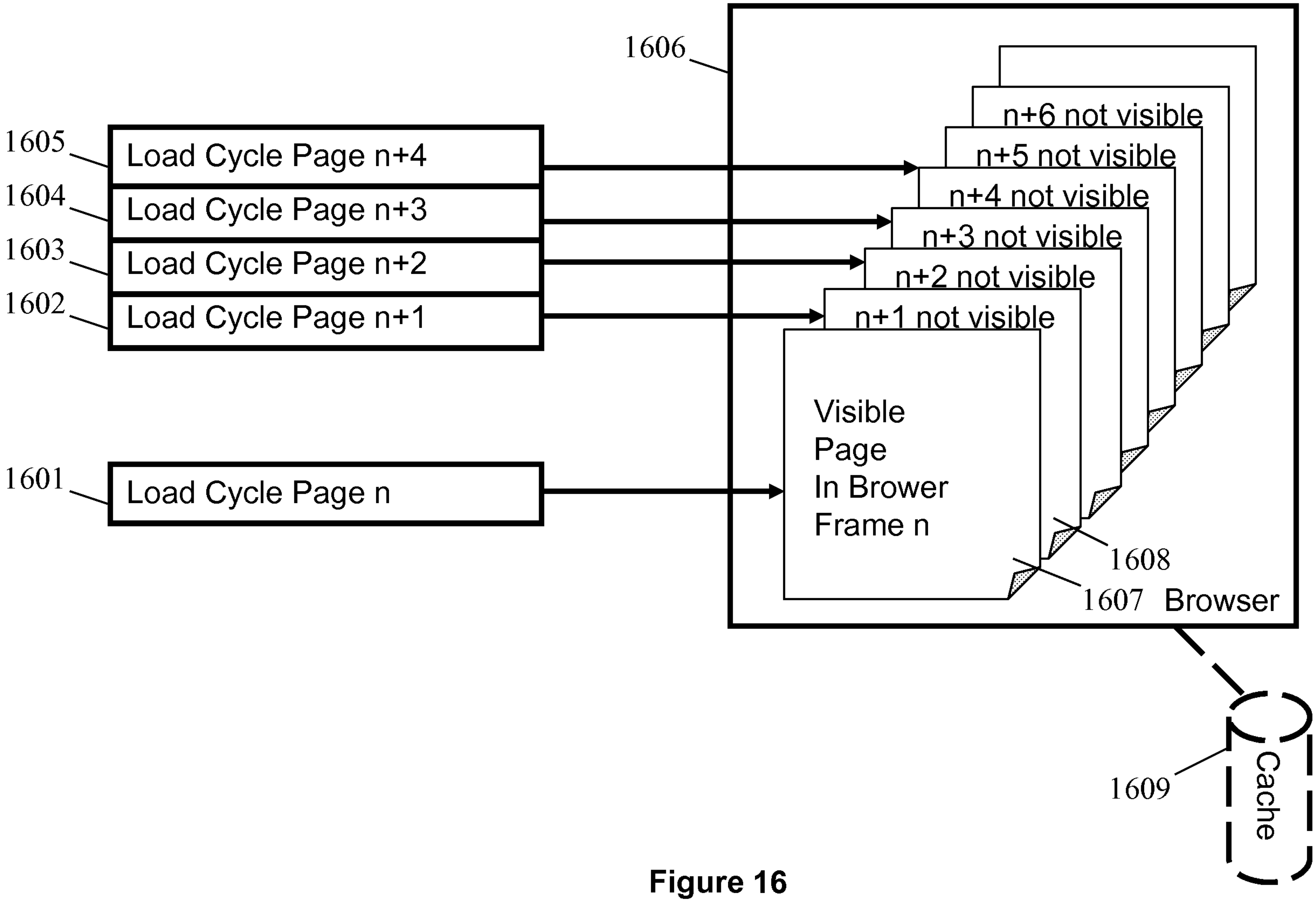


Figure 16

IRDS Look-Ahead Symmetrical Next-In-Queue Page Loading

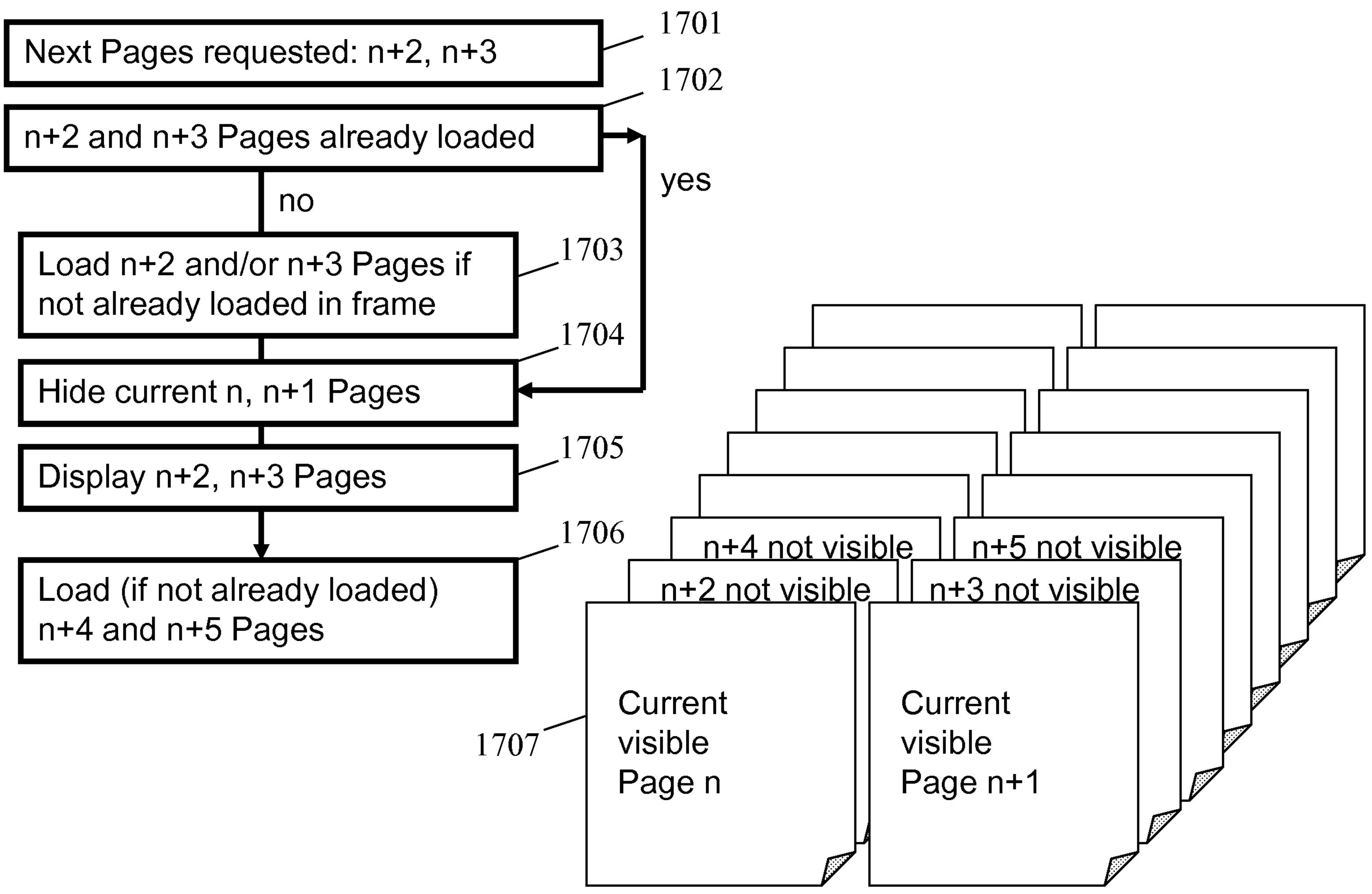

Next Pages requested: n+2, n+3
1701
n+2 and n+3 Pages already loaded
1702
yes
no
Load n+2 and/or n+3 Pages if not already loaded in frame
1703
Hide current n, n+1 Pages
1704
Display n+2, n+3 Pages
1705
Load (if not already loaded) n+4 and n+5 Pages
1706
n+4 not visible
n+5 not visible
n+2 not visible
n+3 not visible
Current visible Page n
Current visible Page n+1
1707

Figure 17

IRDS Look-Ahead Asymmetrical Next-In-Queue Page Loading

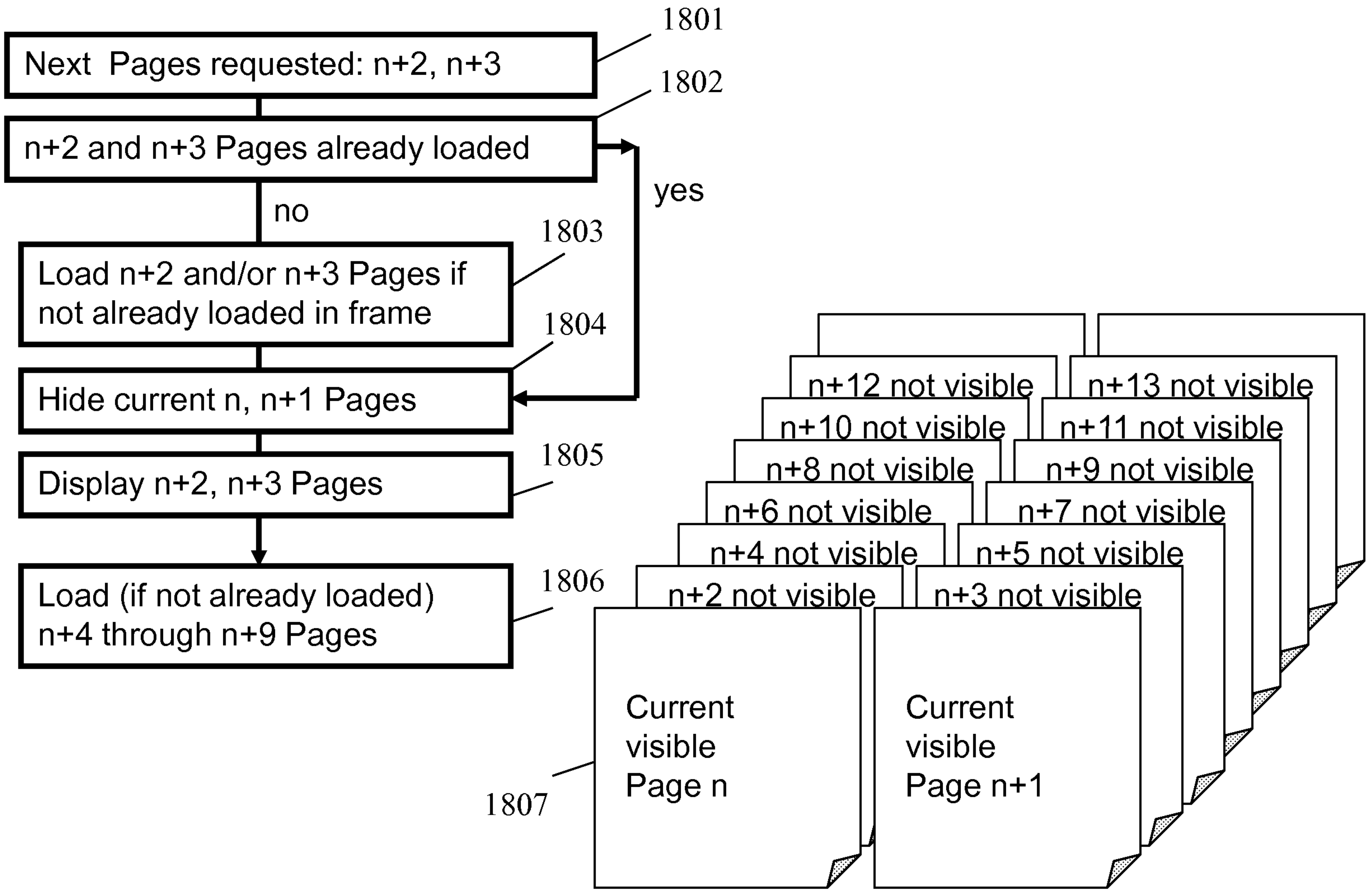


Figure 18

IRDS Directed Look-Ahead Periodic Opportunistic Page Loading

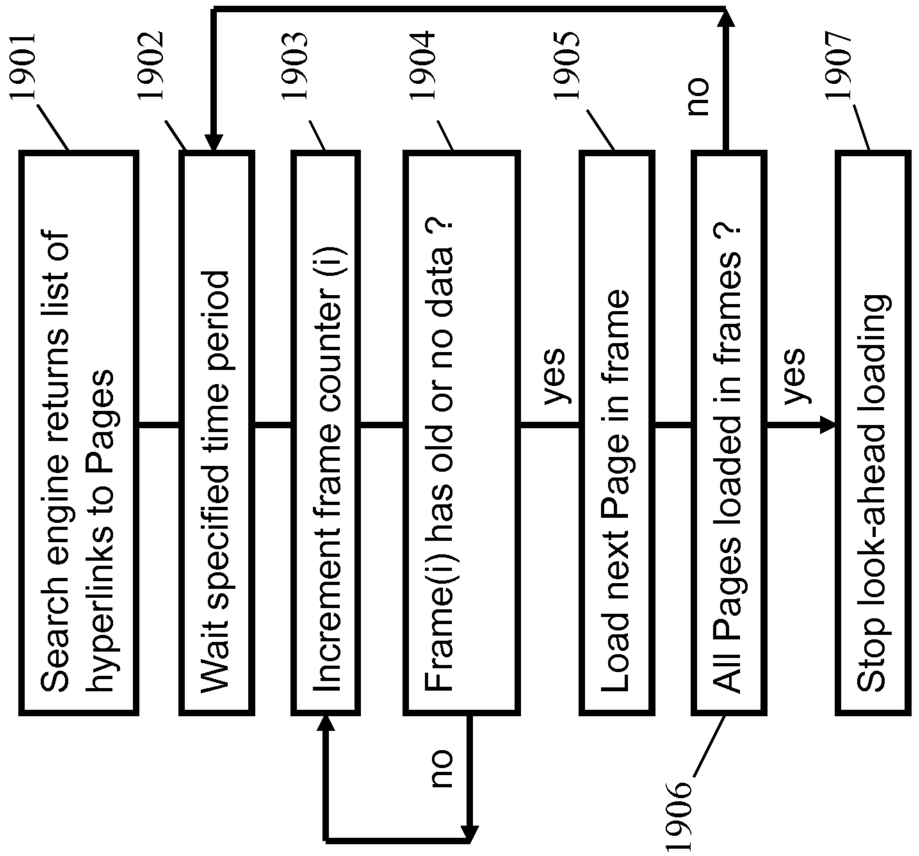

1901
Search engine returns list of hyperlinks to Pages
1902
Wait specified time period
1903
Increment frame counter (i)
1904
Frame(i) has old or no data ?
no
yes
1905
Load next Page in frame
1906
All Pages loaded in frames ?
no
yes
1907
Stop look-ahead loading

Figure 19

IRDS Directed Look-Ahead Periodic Opportunistic Page Loading with Loading Collision Avoidance

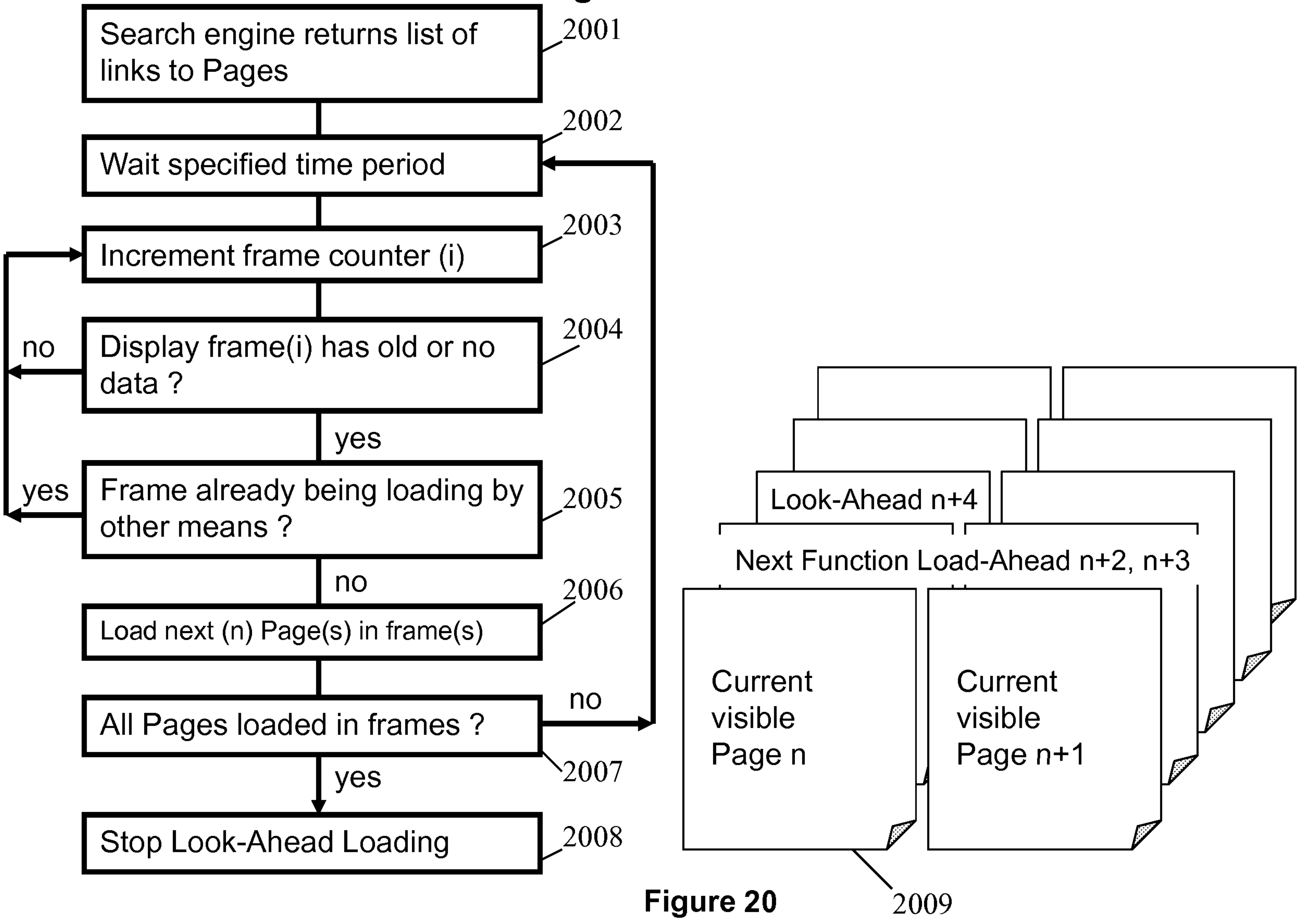

Search engine returns list of links to Pages
2001
Wait specified time period
2002
Increment frame counter (i)
2003
Display frame(i) has old or no data ?
2004
no
yes
Frame already being loading by other means ?
2005
yes
no
Load next (n) Page(s) in frame(s)
2006
All Pages loaded in frames ?
2007
no
yes
Stop Look-Ahead Loading
2008
Look-Ahead n+4
Next Function Load-Ahead n+2, n+3
Current visible Page n
Current visible Page n+1
2009

Figure 20

IRDS Directed Look-Ahead Periodic Opportunistic Page Loading with Network and/or Processor Saturation Avoidance

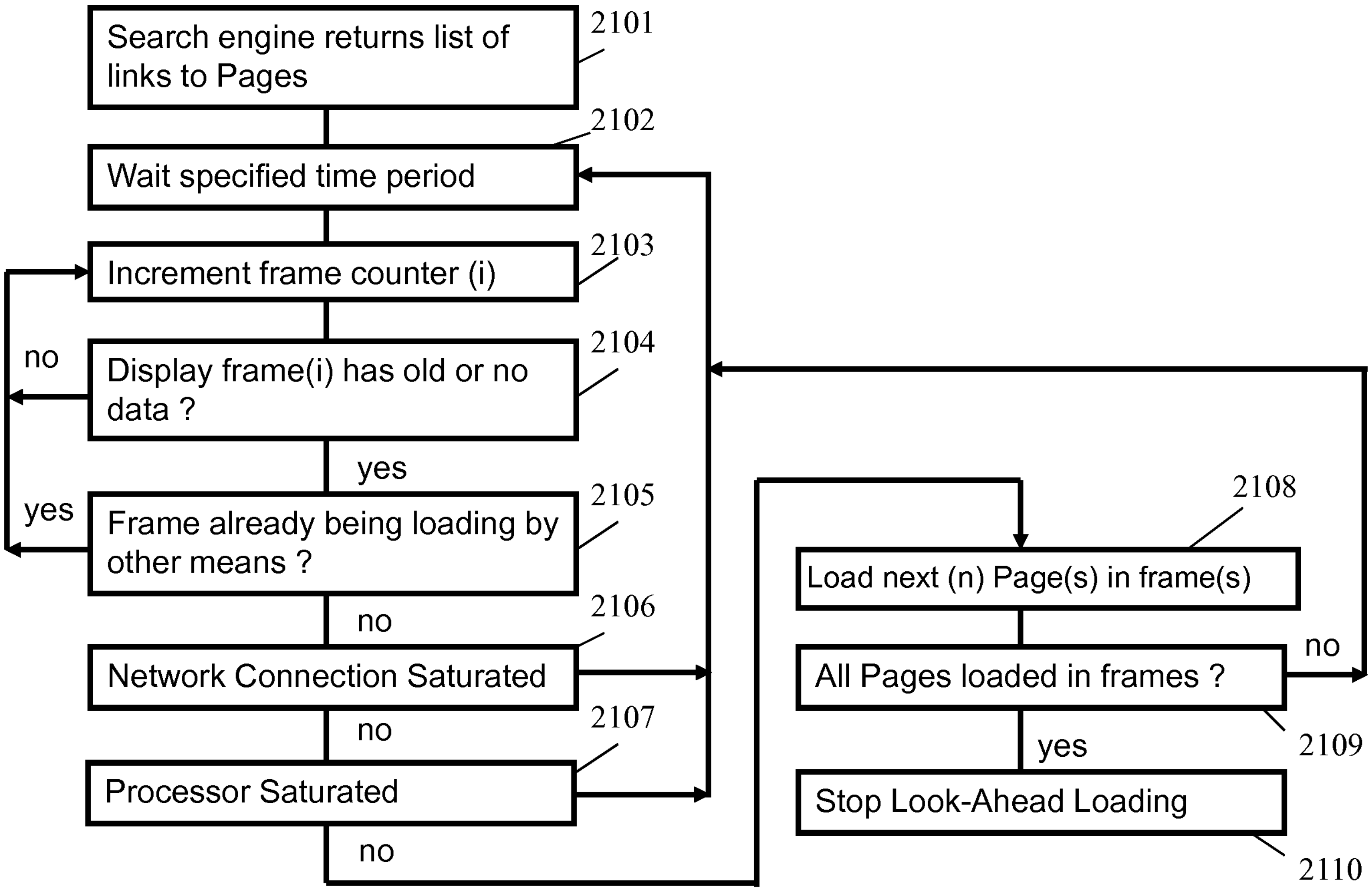

Search engine returns list of links to Pages
2101
Wait specified time period
2102
Increment frame counter (i)
2103
Display frame(i) has old or no data ?
2104
no
yes
Frame already being loading by other means ?
2105
yes
no
Network Connection Saturated
2106
no
Processor Saturated
2107
no
Load next (n) Page(s) in frame(s)
2108
All Pages loaded in frames ?
2109
no
yes
Stop Look-Ahead Loading
2110

Figure 21

IRDS Directed Preemptive Descendant Page Loading

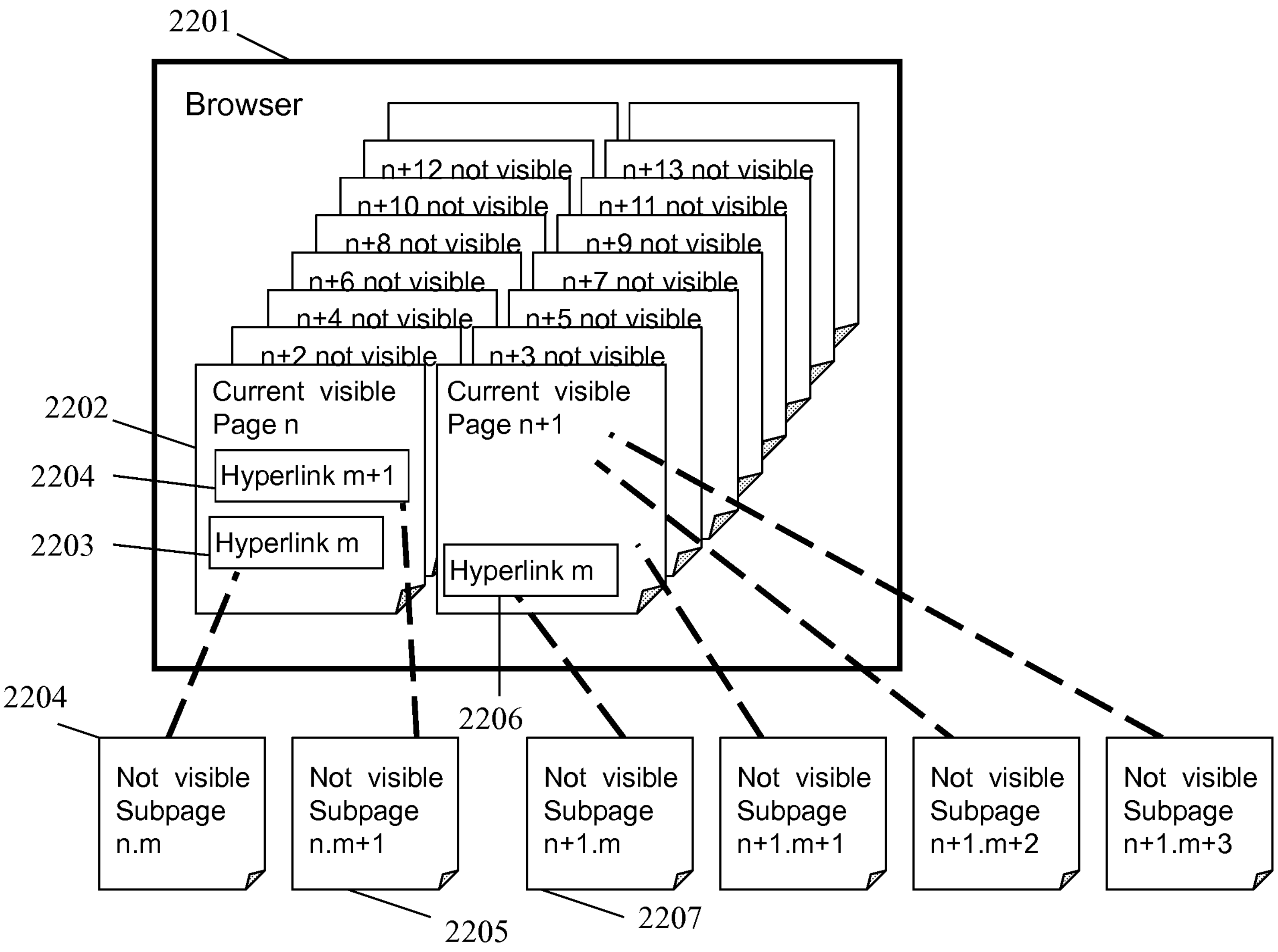


Figure 22

Enhanced Browser Set Number of Pages to Display Function

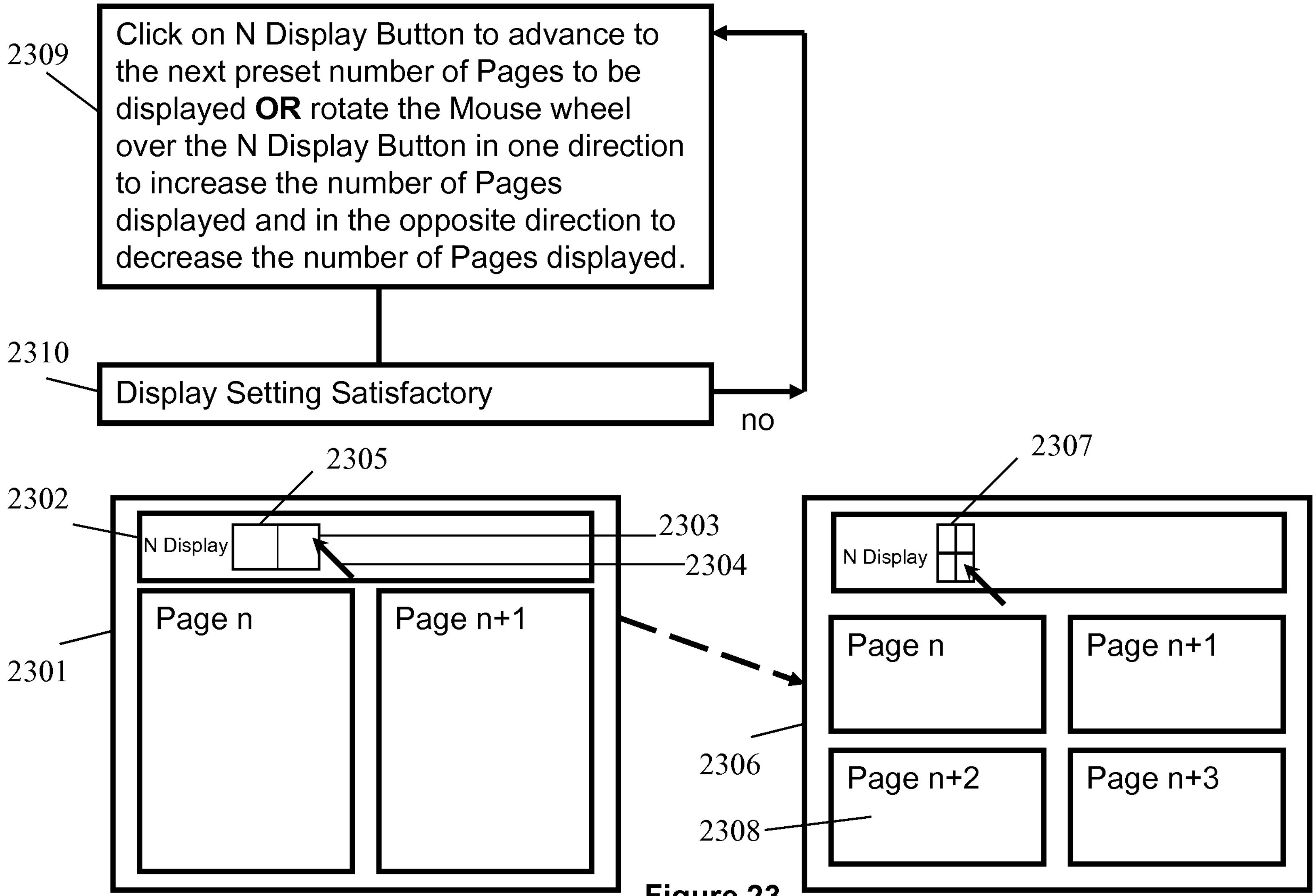

2309
Click on N Display Button to advance to the next preset number of Pages to be displayed **OR** rotate the Mouse wheel over the N Display Button in one direction to increase the number of Pages displayed and in the opposite direction to decrease the number of Pages displayed.
2310
Display Setting Satisfactory
no
2305
2302
N Display
2303
2304
2301
Page n
Page n+1
2307
N Display
2306
Page n
Page n+1
2308
Page n+2
Page n+3

Figure 23

Enhanced Browser Zoom Page Function

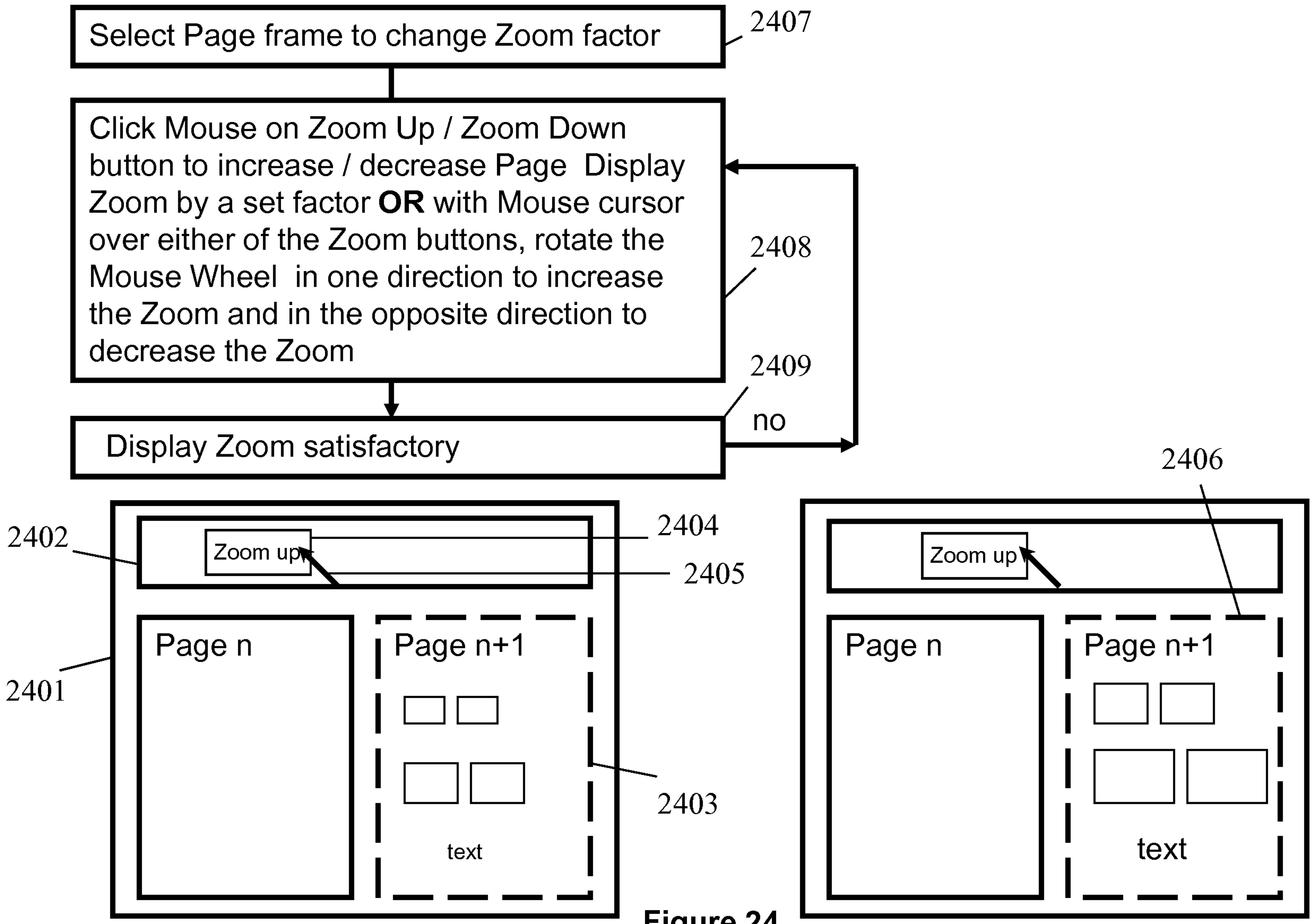

Select Page frame to change Zoom factor
2407
Click Mouse on Zoom Up / Zoom Down button to increase / decrease Page Display Zoom by a set factor **OR** with Mouse cursor over either of the Zoom buttons, rotate the Mouse Wheel in one direction to increase the Zoom and in the opposite direction to decrease the Zoom
2408
2409
no
Display Zoom satisfactory
2402
2404
2405
2401
Zoom up
Page n
Page n+1
text
2403
2406
Zoom up
Page n
Page n+1
text

Figure 24

Enhanced Browser Full Display Function

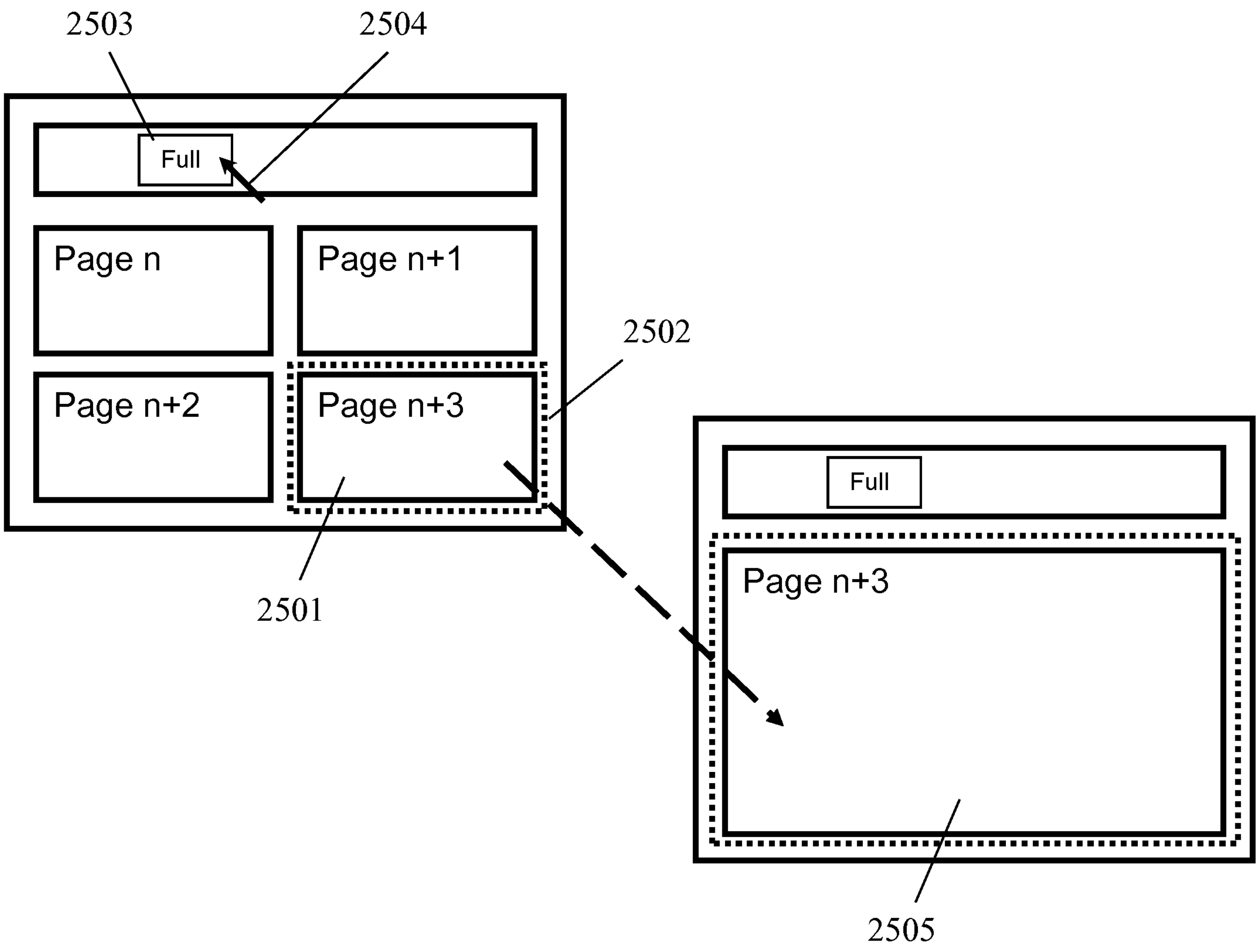


Figure 25

Enhanced Browser Remove Page Function

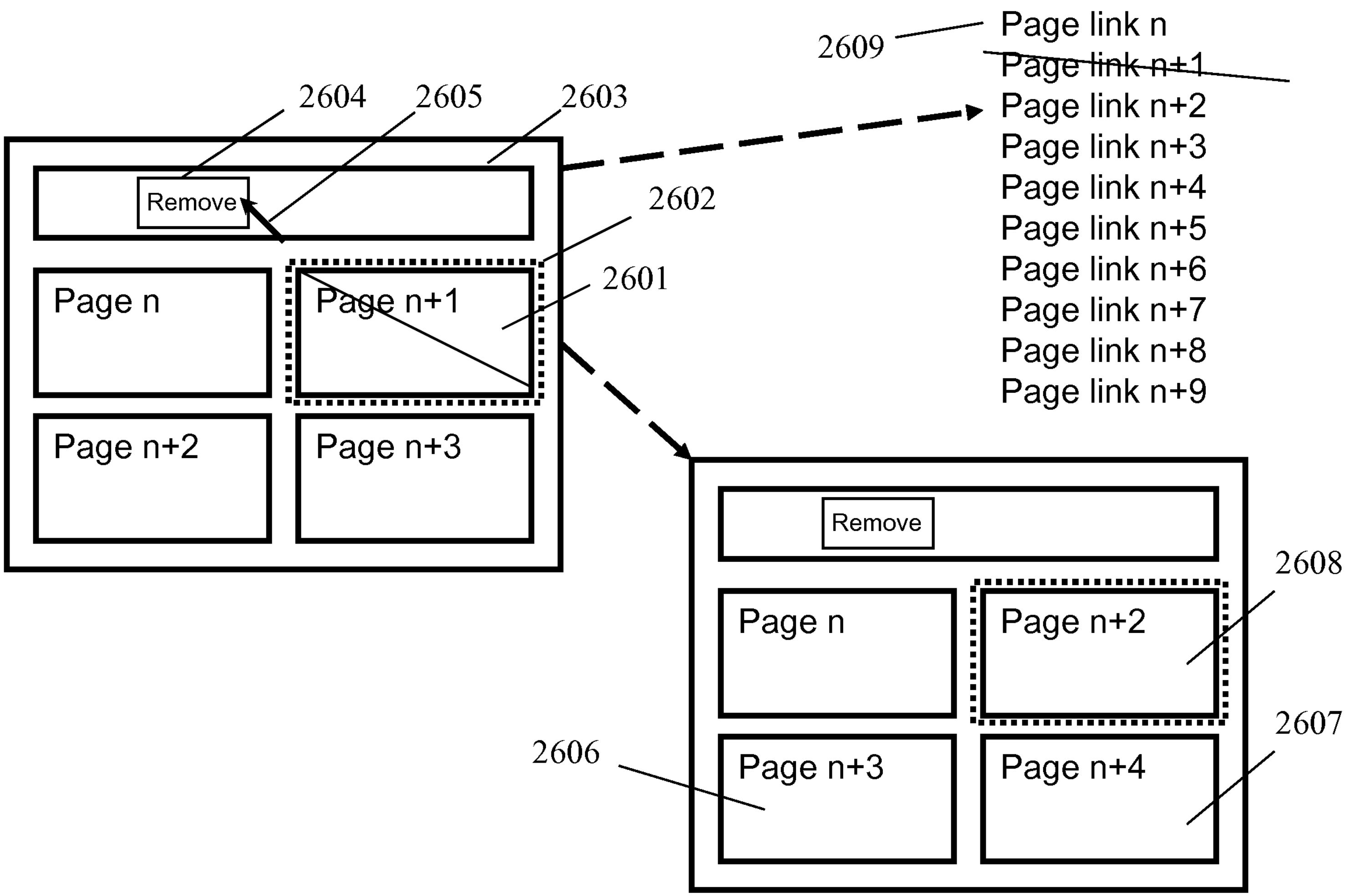


Figure 26

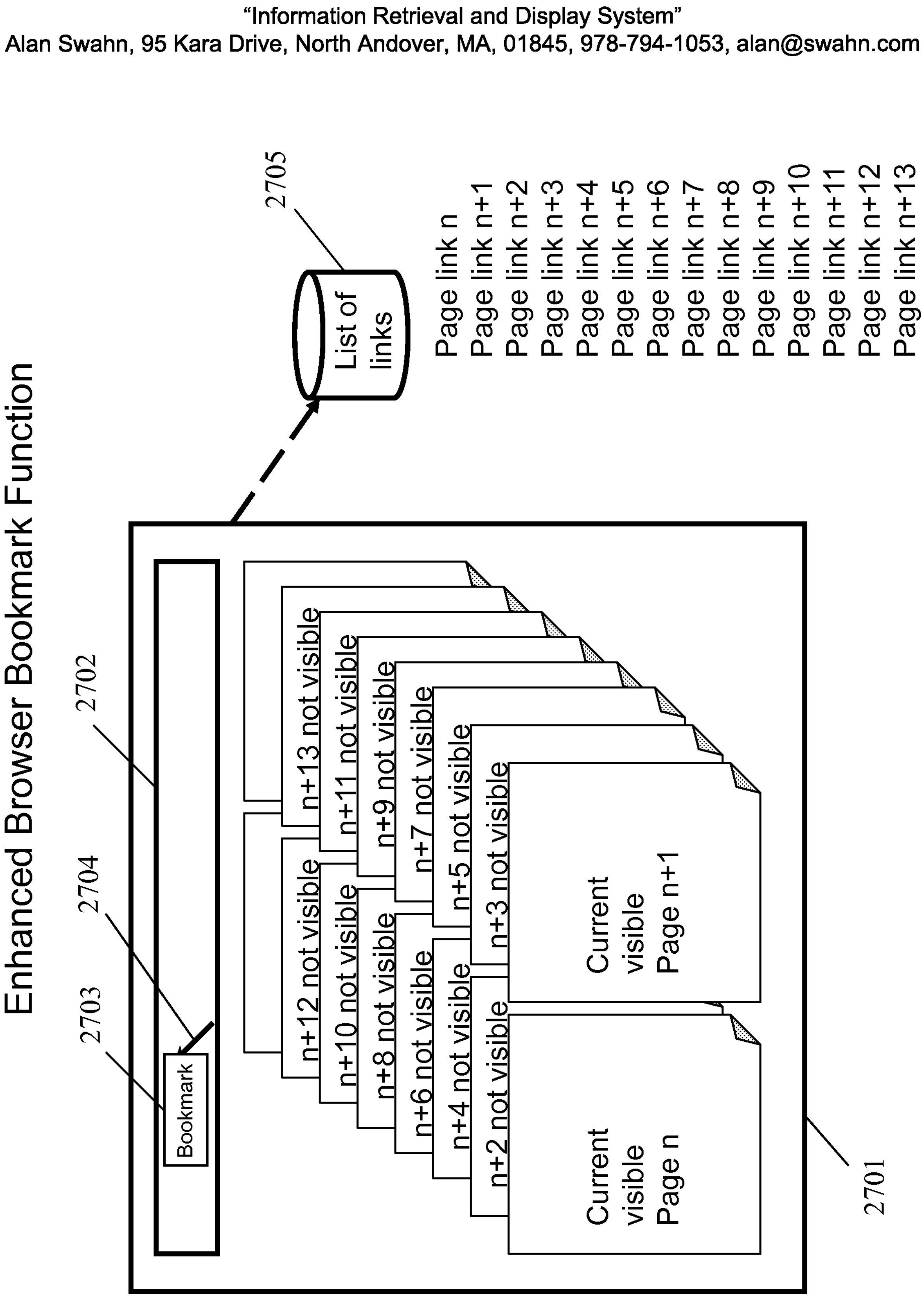

Enhanced Browser Bookmark Function
2703
2704
2702
Bookmark
n+12 not visible
n+13 not visible
n+10 not visible
n+11 not visible
n+8 not visible
n+9 not visible
n+6 not visible
n+7 not visible
n+4 not visible
n+5 not visible
n+2 not visible
n+3 not visible
Current visible Page n
Current visible Page n+1
2701
2705
List of links
Page link n
Page link n+1
Page link n+2
Page link n+3
Page link n+4
Page link n+5
Page link n+6
Page link n+7
Page link n+8
Page link n+9
Page link n+10
Page link n+11
Page link n+12
Page link n+13

Figure 27

Enhanced Browser to Conventional Browser Jump Function

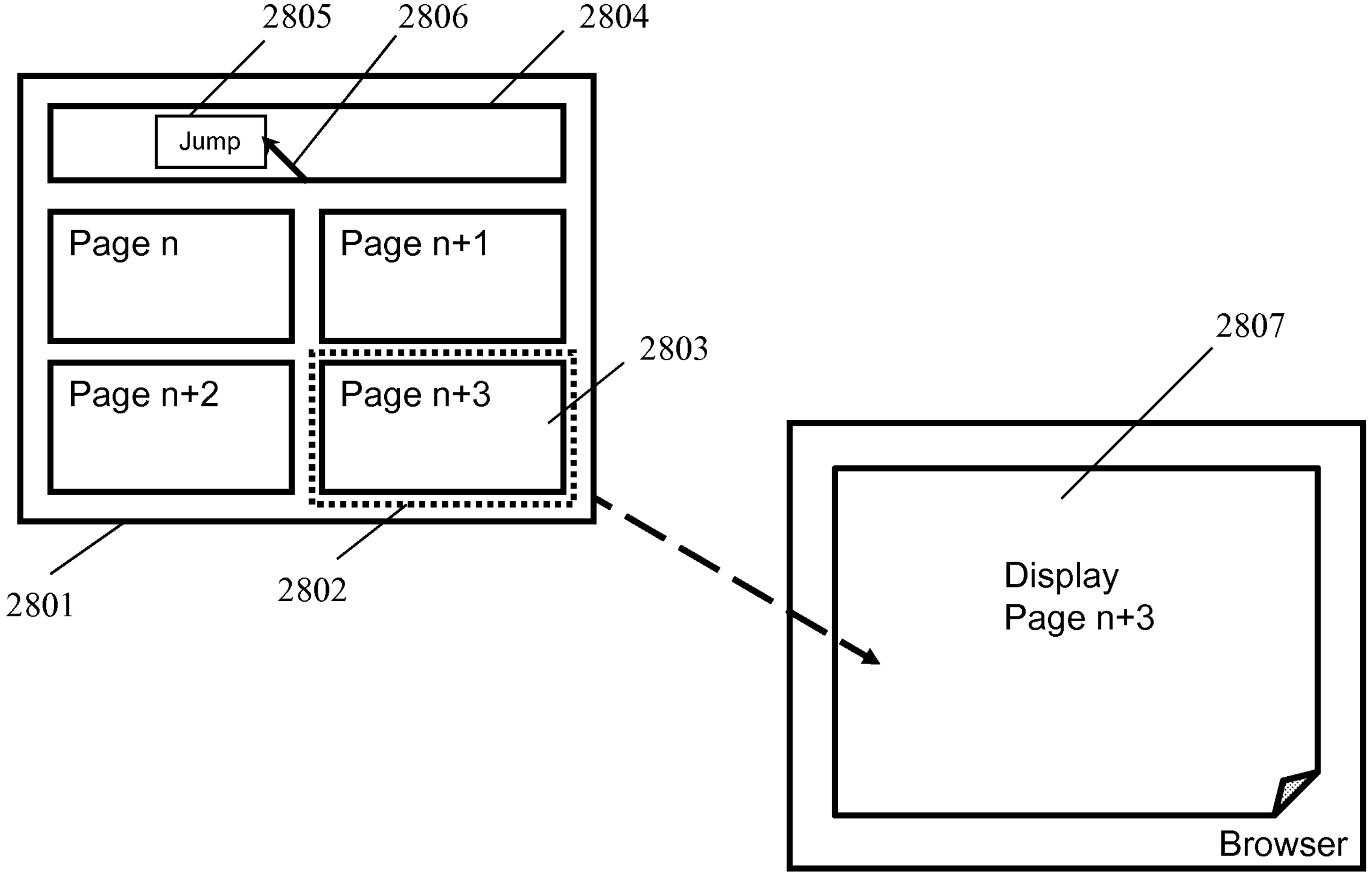


Figure 28

Enhanced Browser Imaging of Selected Page, Pages or Portion Thereof

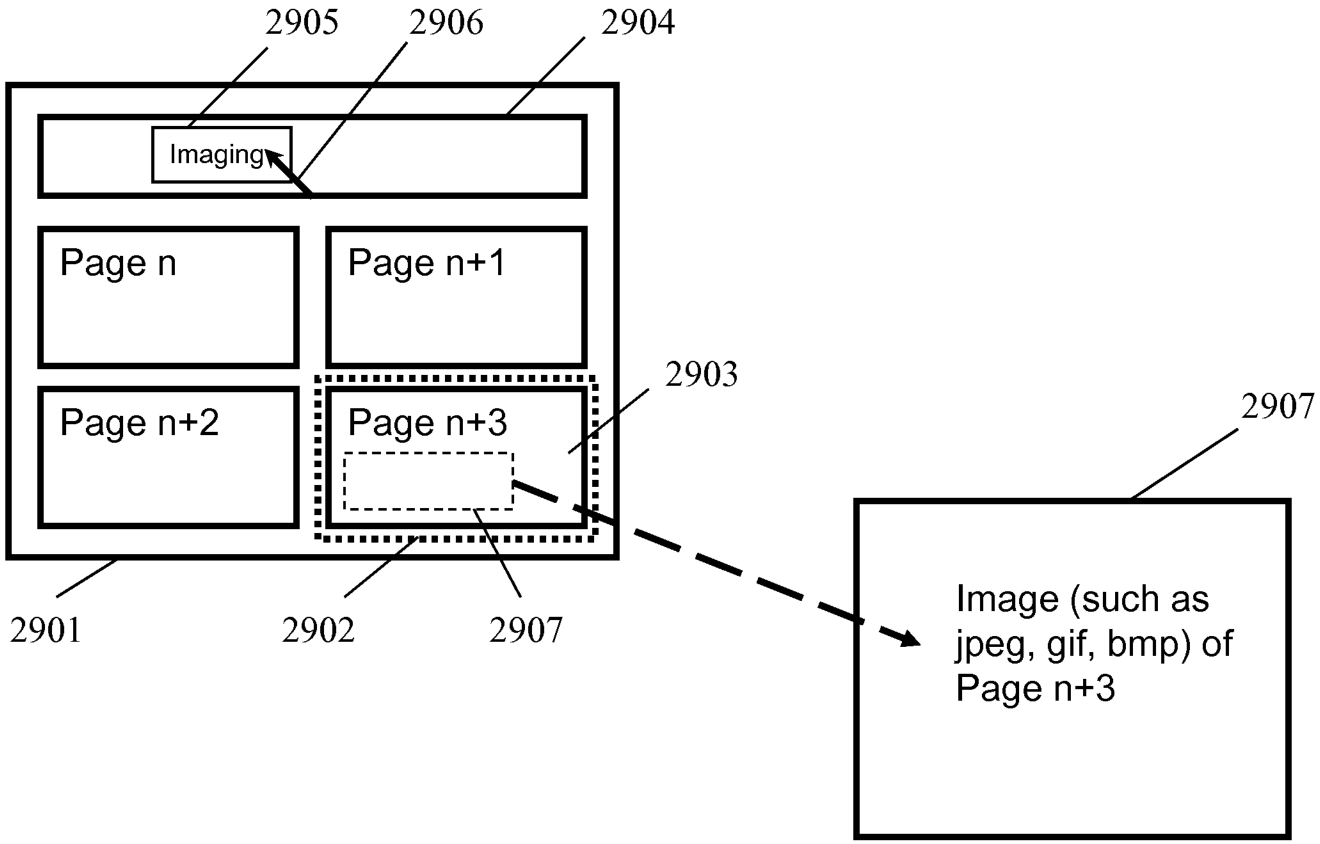


Figure 29